

Deep Supply-Chain Engagement in Conflict Minerals

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Tin, tantalum, tungsten and gold, known as the 3TG, are commonly used in electronics, and other high tech and manufactured products. Their extraction in the Democratic Republic of the Congo, where human rights and civil war are prevalent, means that many 3TG from the region have been categorised as “conflict minerals.” The Conflict-Free Sourcing Initiative (CFSI, now known as the Responsible Minerals Initiative), founded in 2008, now has over 350 original equipment manufacturer (OEM) member companies. The industry group addresses conflict minerals and other risk issues in their supply chains. The CFSI runs the Conflict-Free Smelter Program (CFSP, now known as the Responsible Minerals Assurance Process), which defines standards and validates smelters and refiners as conflict free through third-party audits. A subgroup of the CFSI includes approximately fifty OEM members, constituting the Smelter Engagement Team (SET). The SET targets smelters and refineries deep upstream in the electronics supply chain. This sustainable supply chain management is characterized by both its business collaboration, as well as its focus deep into manufacturing supply chains.

The research investigated mechanisms and effectiveness of deep supply-chain engagement of the SET and its member firms to connect with 3TG smelters and refiners. Specifically, the research addressed methods and frequency of engagement, barriers encountered (e.g. geographical and cultural), resources utilized, and allocation of responsibilities associated with efforts to encourage conflict-free compliance from smelters and refiners. This study employed a parallel convergent mixed methods approach to identify the external forces and internal tactics that allow corporations to engage deeply in their supply chains, beyond the visible horizon, to connect with upstream producers, and the practices through which OEMs work together to engage suppliers. First, data from the CFSI on 323 smelters and refiners were analysed to produce timelines describing forces and events from 2010 to 2017 regarding the participation of 3TG supplier companies in the CFSP. Second, six individuals from the SET were interviewed, and with reference to the timelines, were questioned regarding supplier engagement. An established framework (mostly recently revised by Sauer and Seuring, 2017) on sustainable supply chain management of minerals was used to frame the study and to structure coding and analysis of the interviews.

Contributions of this research to scholarship include testing of the sustainable supply chain management framework, with suggested modifications to categories: *Contextual dimensions (Liability of foreignness and Unique industry considerations)*, *Supply-chain visibility* and *Sustainable pro-activity*. The understanding of mechanisms of deep supply-chain engagement contributes to industry practice by, identifying successful supplier engagement practices and encouraging firms with similar motivations of sustainable supply chain management to consider responsible sourcing of minerals. Numerous tactics for deep supply-chain engagement were identified, including *Targeted Outreach*, *Regionally Specific Engagement*, *Incentives*, and *Mass Outreach*.

Although the research was limited in the number of interviews, and limited in scope to conflict minerals used in the electronics industries, the generalizability of results to other industries is discussed.

Key Words: sustainable supply chain management, conflict minerals, collaboration, responsible sourcing, stakeholder theory, corporate social responsibility, supplier engagement

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Chapter 1: Introduction

1.1 Conflict Minerals and the Conflict-Free Sourcing Initiative

Conflict minerals, tin (Sn), tantalum (Ta), tungsten (W), and gold (Au), known as the 3TG minerals, are commonly used in manufactured products of the electronics, and information and communications technology (ICT) industries. The extraction and production of conflict minerals in Central Africa is especially prevalent in the Democratic Republic of Congo (DRC) and contributes to human rights abuses such as forced labour, sexual violence, and armed conflict. This illegal extraction and trade finances civil conflicts that have led to over 5.4 million deaths in the DRC since 1988 (Partnership Africa Canada, 2016).

There have been several efforts to address the social issues associated with the 3TG mineral supply chains. Section 1502 of the US 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) included requirements for corporations listed on US stock markets to report on the sources of conflict minerals in their manufactured products. Another pertinent legislation effort is the Organization for Economic Cooperation and Development (OECD) Due Diligence Guidance (OECD Guidance), a “collaborative government-backed multi-stakeholder initiative” (p. 3) by providing firms with a “due diligence framework for responsible supply chains of minerals... [and] a model mineral supply chain policy” (p. 16) among other detailed tools and recommendations to prevent further contributions to armed conflict and human rights violations (OECD, 2016).

Members of the Electronic Industry Citizenship Coalition (EICC) and the Global e-Sustainability Initiative (GeSI) founded the Conflict-Free Sourcing Initiative (CFSI) to address conflict mineral issues in their supply chains. The CFSI, now known as the Responsible Minerals Initiative (RMI) helps firms and their suppliers determine smelters and refiners that can be validated as conflict-free through independent, third-party audits that are in line with current global standards, including the Dodd-Frank Act and the OECD Guidance (RMI, 2018).

This “non-state market driven” (Cashore et al., 2004, p. 4) initiative is “a novel mechanism of corporate social responsibility (CSR) and supply-chain sustainability management” (Young and Dias, 2012, p. 3) in the electronics and ICT industries and aligns with Yawar and Seuring’s (2015) suggestion that “successful management of social issues in supply chains... requires collaborative efforts and development strategies” (p.638). Via strategies such as formal protocols, third party audits, stakeholder collaboration, and an industry oversight group (Young and Dias, 2012), OEMs engage directly with smelters and refiners (SORs) upstream in their supply chain (i.e. they often skip over primary manufacturers). The CFSP considers SORs as “chokepoints” to trace and control conflict minerals in the supply chain (Young, 2015), as after minerals are refined, mixed, and added to alloys it is almost impossible to determine origin (Hoffman et al., 2015).

Thus, there are three factors distinguishing the CFSI: 1) it is a business led collaboration, 2) it targets social issues deep in the supply chain (where firms take responsibility right at the source), and 3) it depends on firms voluntarily adopting a level of sustainable supply chain management beyond legal, and economic requirements

The included literature review (Chapter 2) will focus on the four main themes underlying the role, practices, and nature of the CFSI: sustainable supply chain management, business collaboration, stakeholder theory, and institutional theory.

1.2 Problem Statement

Conflict minerals often come from geographically diverse ore deposits, are usually mixed with minerals from different sources, and are commonly used as components of manufactured products; thus, they are difficult to trace (Hofmann et al., 2015). The extensively multi-tiered and shared mineral supply chain results in challenges in tracing resources through the supply chain. In 2014 and 2015 almost 80% of companies stated that they could not determine the origin of the 3TG minerals used, as they are multiple levels between them and the mines and smelters (Kim and Davis, 2016). Furthermore, if the minerals were sourced from the DRC, and the surrounding area, these companies could not determine if their purchase contributed to armed groups (Kim and Davis, 2016). Only 1% of firms definitively stated that their mineral resources were conflict free (Kim and Davis, 2016). Thus, conflict minerals are a systemic problem of supply chain management, rather than the responsibility of a single firm's legal and compliance efforts (Hofmann et al., 2015).

The study of conflict minerals becomes an area through which this research examines deep supply chain engagement in management scholarship at this new intersection of sustainable supply chain management, business collaboration, stakeholder theory, and institutional theory.

1.3 Significance and Contributions

The exploitation of people and abuse of human rights through forced labour, sexual violence, and armed conflict in the extraction and manufacturing of conflict minerals is significant and worth investigating. By examining the effectiveness of business collaborations to engage in deep supply chain sustainability and understanding the success and challenges related to the mechanisms of deep supply chain engagement undertaken by the CFSI this research hopes to raise awareness of the conflict mineral industry. This research will contribute to the scholarship at the intersection of management, business collaboration, and sustainable supply chain management of minerals. Additionally, contributions to industry include determining the mechanisms of deep engagement that are most and least effective in addressing social issues. This has potential for improved sustainable supply chain management strategies in both mineral and non-mineral supply chains.

1.4 Research Question

What external forces and internal tactics allow the CFSI to engage deeply in supply chains, beyond the visible horizon? What are the mechanisms of deep supply chain engagement used by CFSI member OEMs to connect with upstream producers? How effective is it? How do OEMs work together to engage suppliers?

1.5 Definitions of Key Terms

- **3TG** – Tin, tantalum, tungsten, gold; conflict minerals
- **CFSI** – Conflict-Free Sourcing Initiative
- **CFSP** – Conflict-Free Smelter Program
- **CoC** – Chain of custody
- **Collaborative supply chain** – “two or more independent companies work[ing] jointly to plan and execute supply chain operations with greater success than when acting in isolation” (Simatupang and Sridharan, 2002, p.10)
- **Conflict mineral** – material “whose systemic exploitation and trade contribute to human right violations in the country of extraction and surrounding areas” (Hofmann et al., 2015, p. 115)
- **CSR** – Corporate social responsibility
- **Deep Supplier Engagement** – when downstream firms communicate and build relationships with suppliers many tiers upstream, often beyond the visible horizon
- **EICC** – Electronic Industry Citizenship Coalition
- **GeSI** – Global e-Sustainability Initiative
- **GSCM** – Green Supply Chain Management
- **ICT** – Information and Communications Technology
- **MNC** – Multinational corporation
- **OECD** – The Organization for Economic Co-operation and Development
- **OEM** – Original Equipment Manufacturer
- **Responsible Sourcing** – an approach for life cycle management, where “downstream producers seek raw materials and manage upstream production processes to be more

sustainable” (Young, 2015, p. 4); includes tracking or tracing of life cycles (Young and Dias, 2012)

- **SET** – Smelter Engagement Team
- **SOR** – Smelter or Refiner
- **Supply chain due diligence (SCDD)** – “the process through which enterprises can identify, prevent, mitigate and account for how they address their actual and potential adverse impacts as an integral part of business decision-making and risk management systems“ (OECD, 2011, p. 23)
- **Sustainable supply chain management (SSCM)** – “the management of material, information and capital flows as well as cooperation among companies along the supply chain” while incorporating the three pillars of sustainable development – economic, social, and environmental- as determined by their stakeholder demands (Seuring and Muller, 2008, p. 1700)
- **TBL** – Triple Bottom Line

Chapter 2: Literature Review

2.1 Introduction

The purpose of this literature review is to understand the academic literature that forms the foundation of sustainable supply chain management practices. The review seeks to explain the concepts influencing the formation of the CFSI, as well as the unique “deep supplier engagement” (Young, personal communication, 2017) practices the member firms employ. The literature review examines stakeholder theory, sustainable supply chain management theory, business collaboration theory, and institutional theory, as well as their applications to the management of conflict minerals. Through this literature review, a framework of sustainable mineral supply chain emerges, and is adopted as the theoretical framework grounding this research.

2.2 Literature on Stakeholder, Sustainable Supply Chain Management, Business Collaboration, and Institutional Theories

2.2.1 Stakeholder Theory

Stakeholder theory is often used to explain the implementation of green supply chain management (GSCM) (Sarkis et al., 2011). Freeman (1984) defines stakeholders as groups or individuals who affect or are affected by the accomplishment of an organization’s goals. While there are multiple developments and applications of stakeholder theory, due to various

categorizations such as internal or external and primary or secondary, the consistent underlying principle is that stakeholders influence organizational operations by pressuring firms to internalize externalities in order to reduce negative impacts and increase positive impacts (Sarkis et al., 2011). Stakeholder theory is not only a description of relationships between a firm and its stakeholders; it has managerial implications as well (Donaldson and Preston, 1995). Stakeholder management exists upon the normative foundation of stakeholder theory and requires that firms should both recognize the legitimacies of diverse stakeholder interests and try to respond to them (Donaldson and Preston, 1995).

As one group of important stakeholders, non-governmental organizations (NGOs) often hold firms accountable for environmental and social issues in their upstream supply chain, using reputational vulnerability as a pressure (Roberts, 2003). Pressures that firms face include “legal demand/regulation, response to stakeholders, competitive advantage, customer demands, reputation loss, and environmental and social pressure groups” as summarized by Seuring and Muller (2008, p. 1703). “Focal firms”, as discussed by Seuring and Muller (2008), are those that manage the supply chain, directly contact consumers, and control the product being sold. Consequently, a distinctive feature of supply chain management emerges: the pressure a focal firm faces is often transferred onto its suppliers, requiring the focal firm to examine the entire life-cycle of their product and take responsibility for more of their supply chain (Seuring and Muller, 2008). And, according to Silvestre (2015), focal firms are necessary for enhanced supply chain performance as they act as “change agents” and leaders within the supply chain, and have the potential to “specify supply chain policies to other members, and exercise control over the supply chain's decisions and activities” (p. 158).

Schrempf-Stirling and Palazzo (2016) and Roberts (2003) agree that NGO activism is a primary driver in upstream corporate social responsibility (CSR) management, especially since the focus of upstream CSR has shifted from worker to human rights, from contract reasoning to social connections, and lastly, from a perspective of opposition to that of collaboration. Furthermore, the value of NGOs as key stakeholders is evident, as persistent pressure on MNCs results in some corporations beginning to adopt full producer upstream CSR by addressing conflict minerals at increased depths in their supply chain (Schrempf-Stirling and Palazzo, 2016).

Rotter et al. (2014) suggest that in order to manage problems – such as conflict minerals – characterized by globalization, deregulation, and crises, a political CSR approach is one method through which businesses are powerful stakeholders. Political CSR “suggests an extended model of governance with business firms contributing to global regulation and providing public good... [and] where private actors such as corporations and civil society organizations play an active role in the democratic regulation and control of market transactions” (Scherer and Palazzo, 2011, p. 901). Rotter et al. (2014) add that political CSR expands a firm’s corporate conduct to include addressing issues such as (lack of) respect for human rights while still maximizing business value.

Sarkis et al. (2011) identify future research opportunities in “internationally focused stakeholder theory” which has increased in relevance due to the globalization of supply chains and the expansion stakeholder’s “visible horizons” (the limit to which an agent is aware of the supply chain (Carter et al., 2015)), and, in turn, the depth to which firms take responsibility in their

supply chains. In light of this phenomenon, Sarkis et al., (2011) also suggests investigating the standardization of supply chains, such as environmental standard ISO 149001, as a market signal that firms and their suppliers within their supply chain operate with recognized management practices.

When addressing the problem of conflict minerals, focal firms (Seuring and Muller, 2008), especially those within the electronics industry, are adopting responsibility for the entire supply chain by co-designing new self-regulations (Rotter et al., 2014). Despite the complexity of conflict mineral supply chains, and potential that a firm may or may not source conflict minerals, these focal firms have adopted a political CSR approach to work with other stakeholders – civil society actors, governments, and intergovernmental organizations – to collaboratively solve this issue (Rotter et al., 2014). Silvestre (2015) claims that in complex and uncertain business environments – such as the mining of conflict minerals – focal firms have an important role in “managing the escalating ambiguity, stimulating supply chain learning, and promoting innovation towards supply chains enhanced sustainability performance” (p. 156).

In conflict mineral supply chains, the members of the CFSI are downstream stakeholders – or focal firms – that put pressure on their upstream suppliers to address social issues and participate in the CFSP. Furthermore, the CFSI allows competing stakeholders to build stronger capabilities for sustainable supply chain management of minerals by identifying their shared upstream stakeholders (i.e. mines, smelters, and refiners), creating new business collaborations between downstream OEMs and industry associations, focusing on international stakeholders, and driving agents to look deeper in their shared supply chains.

2.2.2 Sustainability Supply Chain Management Theory

According to Carter et al. (2015), the supply chain has six underlying characteristics: (1) the supply chain is a network consisting of nodes [agents] and links; (2) the supply chain is a complex adaptive system, where “each node in the supply chain has control over resources and accountability”(p. 90); (3) the supply chain is relative to agents, as “what the agent sees may vary depending on the type of raw materials and parts that it sources and deliver” (p. 91); (4) the supply chain has both physical and support components, that describe the movement of goods and finance and/or information respectively; (5) “the visible horizon of the focal agent” (p. 93) is the limit to which an OEM is aware of agents their supply chain; and (6) “the visible horizon of the focal agent is subject to attenuation, where distance is based on factors including physical distance, cultural distance, and closeness centrality” (p. 94).

An agent is an actor in a supply chain that looks upstream (towards suppliers) and downstream (towards buyers), however, visibility in both directions is limited which, consequently, can create “blind spots” (Carter et al., 2015). Visibility, or lack thereof, is among the dominant factors impeding supply chain accountability and sustainability; other factors include organizational and supply chain complexity (Kim and Davis, 2016). Klassen and Vereecke (2012) add that there is a relationship between social issues and societal expectations that expands normatively, suggesting that in order for social management capabilities to be effective, they must be localized for stakeholders. Thus, it can be concluded that there is a relationship between a given supply chain’s visibility to stakeholders and subsequent pressures stakeholders place upon firms to take responsibility for social issues in their supply chain. Furthermore, in addressing the role of stakeholder pressure in driving CSR, Wolf (2014) promoted “proactive [SSCM] strategies”

which accept sustainability of resource supply as responsibility to an organization—regardless of stakeholder pressures.

Seuring and Muller (2008) define sustainable supply chain management (SSCM) as “the management of material, information and capital flows as well as cooperation among companies along the supply chain” (p. 1700) while incorporating the three pillars of sustainable development – economic, social, and environmental – as determined by stakeholder demands. Similarly, Ahi and Searcy (2013) integrate business, sustainability, and supply chain management to define SSCM as a coordinated supply chain which voluntarily integrates economic, environmental, and social considerations where business systems are “designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, competitiveness, and resilience of the organization over the short- and long-term.” (p. 339).

Silvestre (2015) indicates that despite globalization as a supply chain trend, natural resource-based supply chains are often more geographically bounded, due to limited locations of resource deposits, and are more susceptible to local social demands than other supply chains. Furthermore, supply chains in developing economies face unstable business environments and institutions, and higher degrees of complexities and uncertainties (Silvestre, 2015).

Hoffman et al. (2015) offer the concept of “supply chain due diligence” (SCDD) as a mechanism by which to manage social issues associated with the extraction and trade of conflict minerals, as

SCDD incorporates all key actors into a chain of custody (CoC) that accounts for minerals from the mine through export and finally at the point of sale. This “responsible sourcing” is an approach used in life cycle management by which downstream firms sustainably manage both the extraction of raw materials and upstream manufacturing processes and have the potential to “provide substantial amounts of compliant materials to global markets, without a continuous connection along the product chain from raw material to end-products” (Young, 2015, p.2).

Figure 1 depicts the multi-tiered and shared mineral supply chain, which creates a web of complexity. It portrays upstream producers (e.g., mines, mineral processors, regional transporters, and traders of minerals, smelters, refiners); midstream suppliers (e.g., global shippers, traders, and metal and chemical producers); and lastly, downstream OEMs (e.g., component and final product manufacturers, including brand-name OEM companies). The lack of a continuous connection in the conflict mineral supply chain is seen in the inability for downstream firms to trace their resources through multiple tiers of their supply chain (Kim and Davis, 2016). Thus, conflict minerals are a systemic problem of supply chain management, rather than the responsibility of a single firm’s legal and compliance efforts.

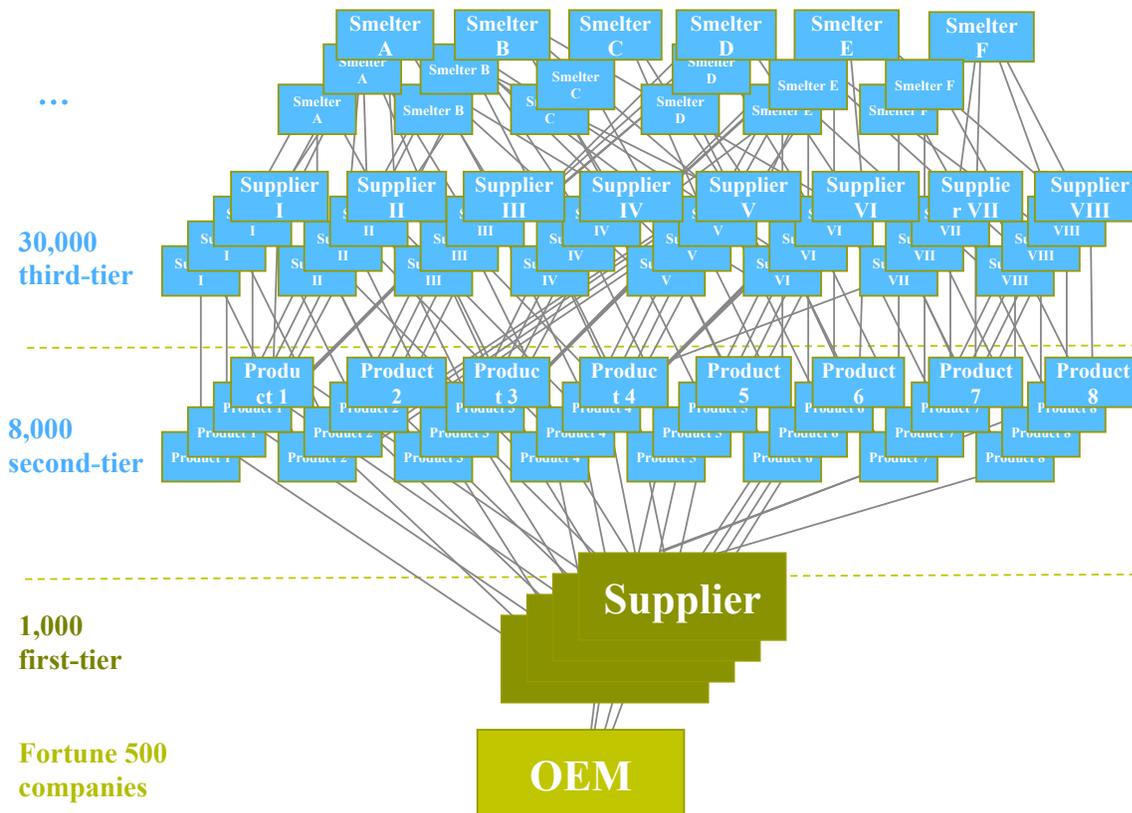


Figure 1 Multi-tier Mineral Supply Chain (based on CFSI, 2017)

In order to manage this web of complexity, in sustainable supply chain management, smelters and refiners have been identified as “chokepoints” (Young et al., 2014). In practice, these chokepoints serve as an effective tool by which downstream OEMs can identify and engage with upstream suppliers (Young, 2015). Figure 2 (below) shows the positioning of smelters and refiners within the supply chain and as the identified target of the CFSP.

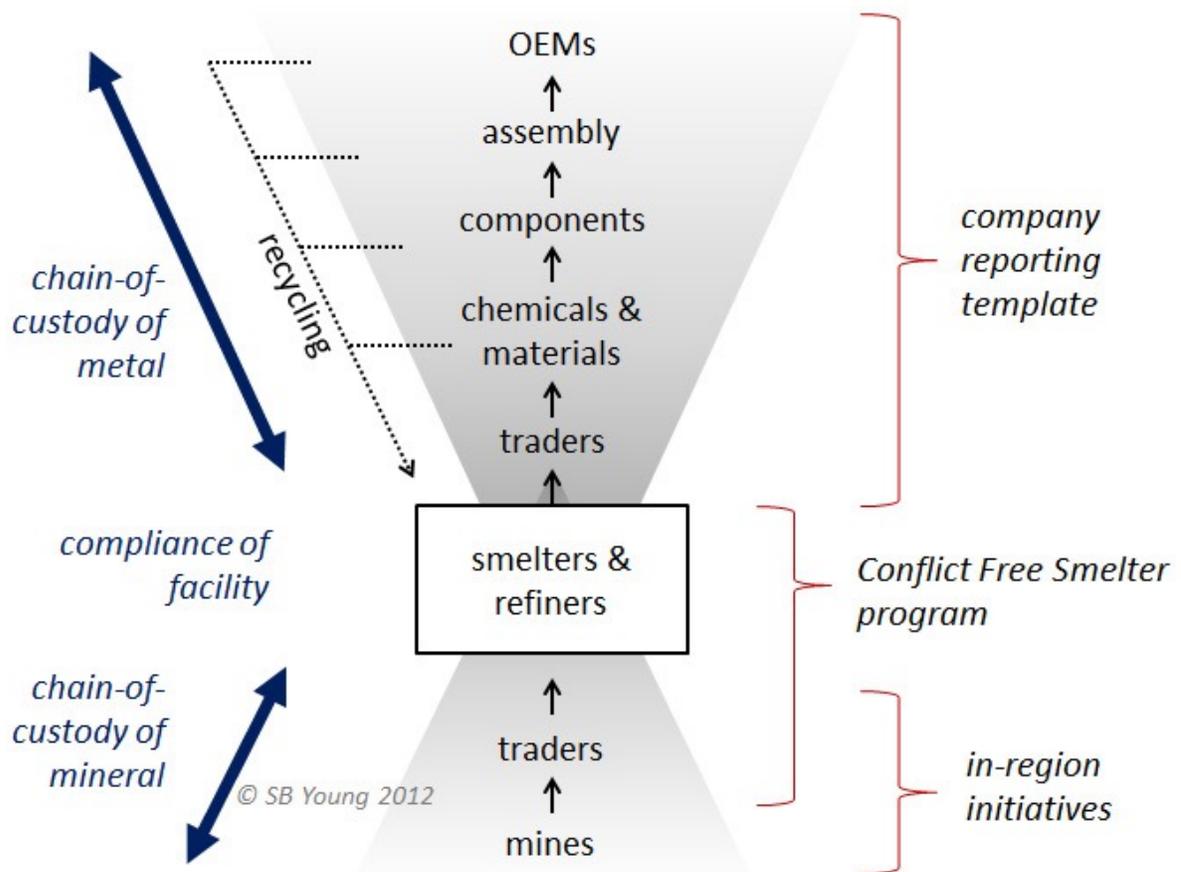


Figure 2 Smelters and Refiners as the Chokepoint in Mineral Supply Chains (source Young and Dias, 2012)

When using the problem of conflict minerals to examine supply chain management, responsible and conflict free sourcing demonstrates the potential of compliance and supplier strategies to span multiple tiers of a supply chain in order to address social issues in developing countries (Young, 2015). Taka (2016) extends this by stating that the conflict minerals issue created a “shift in responsible supply chain management [by] ... extending producer responsibility to respect human rights in the total supply chain through establishing traceability and transparency; and developing legally binding supply chain responsibility” (p. 37). Taka (2016) also suggests closed-pipe supply chain as a potential means to build stakeholder relationships and positively

affect socio-economic structures in the resource-based communities. Silvestre (2015) identifies a gap in theoretical and applied research in addressing the role focal firms take in driving supply chains towards sustainable activity, as well as on how and why there is variation (such as in pace of change) in the evolution of supply chain sustainability within different countries and industries.

2.2.3 Business Collaboration Theory

Cao and Zhang (2011) identify a growing need for firms to look beyond their organization and “collaborate with partners to ensure that the supply chain is efficient and responsive to dynamic market needs” (p. 163). This collaborative supply chain is defined as “two or more independent companies work[ing] jointly to plan and execute supply chain operations with greater success than when acting in isolation” (Simatupang and Sridharan, 2002, p. 10). According to Simatupang and Sridharan (2002), there are three common collaborative supply chain structures: vertical, horizontal and lateral. Vertical collaboration describes multiple firms physically related in the supply chain (such as manufacturers, distributors, retailers) sharing resources, expertise, and responsibility to meet the needs of similar end customers; horizontal collaboration describes the unrelated or competing firms; and lastly, lateral collaboration draws characteristics of both vertical and horizontal collaboration (Simatupang and Sridharan, 2002). Characteristics of a successful collaboration include explicit identification of strategic needs, forward looking planning and management, operations that meet goals, and an evaluation process (Simatupang and Sridharan, 2002). These elements are similar to the “Plan, Do, Check, Act” (PDCA) tool utilized by the International Organization for Standardization (2015). Lastly, Simatupang and

Sridharan (2002) conclude that collaborating supply chain members should align incentives, adopt appropriate and consistent performance measures, combine policies, and share expertise.

There could also be a financial benefit to firms that participate in collaborations with those with similar goals and values. Cao and Zhang (2010) established that collaboration in the supply chain creates an advantage that allows members in the supply chain to improve performance. When looking at business collaborations through the lens of resource dependence theory, a normative observation arises where “in the supply chain, member firms should be dependent and collaborate to seek higher performance gains in the long-run instead of pursuing short-term benefits at the expense of others” (Sarkis et al., 2011, p. 8). Resource dependence theory proposes that organizations are not completely self-sufficient but, rather, are dependent on resources from others (Pfeffer and Salancik, 1978). These shared dependencies form stakeholder relationships where competitive firms could participate in collaborative activities (Donaldson and Preston, 1995). A caveat of collaboration between competitive firms, however, is the promotion of self-interest at the expense of other members, and thus, it is necessary to establish management that works to align goals, practices, and benefits (Cao and Zhang, 2010). Duffy et al. (2013) states the need for fairness in collaborative supply chain relationships as actions of one stakeholder could influence the competitiveness of partnered stakeholders.

Vachon and Klassen (2006) identified a positive relationship between the integration of supply chain members and green collaboration. Roberts (2003) believes effective ethical sourcing initiatives require, not only building a firm’s capacity to manage procurement in order to address environmental and social issues within the supply chain, but also participating in meaningful relationships with different “agents” (Carter et al., 2012) of the supply chain and with external

organizations. Additionally, an increase in a firm's responsibility for social issues in their supply chain results in an increase in partnerships between those in the supply chain with similar attitudes regarding social issues (Klassen and Vereecke, 2012). This is seen in the recent development of upstream CSR and full producer responsibility as they incorporate wider practices such as human rights and environmental considerations, and socio-political complexities in all operations upstream in the supply chain (Schrempf-Stirling and Palazzo, 2016). This model of upstream CSR follows a political logic that results in collaborative and deliberative solutions where individual CSR initiatives are inferior to broad scale multi-stakeholder and multi-industry initiatives and solutions (Schrempf-Stirling and Palazzo, 2016).

According to Rotter et al. (2014), in order to address conflict minerals and manage ethical sourcing in global supply chains, firms collaborate with other agents such as industry members, civil society actors and public authorities in a unique network. Their unique aim to “balance power and work toward a common goal... differs from traditional company negotiations” (Rotter et al., 2014, p. 595). Furthermore, the firms' industrial and extensive stakeholder collaboration creates “self-imposed regulations” which reflect a moral stand in issues concerning conflict mineral production, create legitimacy with the goal of influencing other stakeholders, and work toward a conflict-free mineral trade market (Rotter et al., 2014). Heras-Saizarbitoria and Boiral (2012) add that “meta-standards as self-regulation mechanisms” act as “signalling models [of] social legitimacy” (p. 51) to stakeholders. Thus, the laterally collaborative CFSI, can be regarded as a form of self-regulation of conflict minerals by the electronics industry, where its meta-standards (i.e. audits, certifications etc.) signal particular supplier characteristics that can lead to overall lower search and monitoring costs in the mineral supply chain (Heras-Saizarbitoria and

Boiral, 2012).

In addressing conflict minerals in global supply chains, the OECD Guidance emphasizes collaborative approaches as tools to solve complex challenges (OECD, 2016). Members of the CFSI are often competitors in the ICT industry, yet, collaborate in pursuing sustainable supply chain management as their supply chains are shared networks with limited visibility into deep suppliers. The CFSI includes collaboration between firms to coordinate pooled financial resources, expertise, and SSCM strategies (Young, 2015). Evidence of collaboration in the CFSI extends beyond the member firms, as “the CFSP has established agreements with other conflict-free programs that run in parallel ... [which] increase[s] the scope of coverage of compliant companies, strengthen awareness and interaction with smelters, and provide efficiencies in auditing processes” (Young, 2015, p. 14). Through combining resources and capabilities, members can take advantage of new profitable opportunities (Simatupang and Sridharan, 2002) and jointly develop.

2.2.4 Institutional Theory

According to Giunipero and Ketchen (2004), institutional theory suggests that firms make organizational choices and “emphasize certain supply chain practices because they observe other firms doing so” (p. 530) as a response to external pressures. DiMaggio and Powell (1983) further argue that institutions within organizational fields (those that produce similar products or services or rely upon similar suppliers and resources) are pushed towards homogenization due to pressures, resulting in three types of isomorphism: coercive isomorphism, mimetic isomorphism, and normative isomorphism. Coercive isomorphism is the result of authoritative “formal and

informal pressures exerted on organizations by other organizations upon which they are dependent and by cultural expectations in the society within which organizations function” (DiMaggio and Powell, 1983, p. 150). These pressures could be force, persuasion, or invitations to collaborate. Additionally, coercive isomorphic change can be a response to legislation (DiMaggio and Powell, 1983). Mimetic isomorphism results from management of uncertainty, as “when goals are ambiguous, or when the environment creates symbolic uncertainty, organizations may model themselves on other organizations” (DiMaggio and Powell, 1983, p. 150). Imitation based on mimetic behaviour is advantageous when organizations have to manage a problem with complex or ambiguous causes and solutions (DiMaggio and Powell, 1983). Lastly, normative isomorphism is a result of professionalization. The two main components of professionalization, that contribute to normative isomorphism are “the resting of formal education and of legitimation in a cognitive base produced by university specialists...[and] the growth and elaboration of professional networks that span organizations and across which new models diffuse rapidly” (DiMaggio and Powell, 1983, p. 152).

Campbell (2007) identifies a relationship between institutional theory, stakeholder theory, and corporate social responsibility, stating that firms are more likely to engage in socially responsible behaviours, when they are part of industry associations and in dialogue with stakeholders. Additionally, Campbell (2007) explains that “strong state regulation, collective industrial self-regulation, NGOs and other independent organizations... and a normative institutional environment that encourages socially responsible behaviour” (p. 962) are other factors contributing to a firm’s decision to engage in socially responsible corporate behaviour. Sarkis and Zhu (2007) agree that normative and coercive pressures can lead to organizations

adopting better environmental practices, but depend on regulatory pressures, economic support, and the strategic championing of GSCM practices across the supply chain through market pressure. In contrast, Sarkis and Zhu (2007) argue that mimetic pressures do not require as much economic support to implement GSCM strategies, as participation in trade associations and benchmarking activities often leads to better economic returns. Further, decisions, including SSCM strategies, founded on mimetic pressure are seen as wise when the proposed action is “viewed as highly legitimate and stakeholder support depends on the adoption of a legitimate action” (p. 54) as unconformity could lead to negative performance consequences (Giunipero and Ketchen, 2004).

Applying institutional theory to the problem of conflict minerals presents the case for implementation of regulatory measures, such as legislation and self-regulation, as well as market pressures. Both downstream firms and upstream suppliers are more likely to adopt socially responsible strategies when faced with regulatory pressures (Sarkis and Zhu, 2007; Campbell, 2007). In the ICT organizational field, supply chain agents are required to meet, or conform to, the requirements of the U.S. 2010 Dodd-Frank Act and the OECD Due Diligence Guidelines. When using market pressure to drive the adoption of SSCM strategies, end-consumer demand is likely ineffective as they are unaware of and distant to supply chain practices (Giunipero and Ketchen, 2004; Fitzpatrick et al., 2014). Furthermore, in order to be effective at minimizing the contribution of mineral extraction and production to conflict, market pressure must come from multiple sectors, as the consumer electronics sector is only responsible for a small fraction of the total use of 3TG metals (Fitzpatrick et al., 2014). Through the CFSI’s program the CFSP, downstream member firms respond to legislative pressures by meeting the requirements of the

Dodd-Frank Act and the OECD Due Diligence Guidelines, and upstream suppliers respond to multi-sector market pressures exerted by the CFSI and the industry associations it collaborates with (such as the LBMA, RJC, ITSCI).

2.3 Conceptual Framework

Sauer and Seuring (2017) present a framework that identifies the key sustainable mineral supply chain management practices that fulfill the requirements of sustainability and thus contribute to business performance. They group these practices into six categories (orientation, government interventions, collaboration, continuity, risk management, and pro-activity) and then within three hierarchies (strategic values, structure, and processes). While the authors suggest this framework can practically guide professionals in implementing sustainable supply chain management, limitations of this framework include a lack of empirical testing (Sauer and Seuring, 2017). This framework is presented in Figure 3 and explained in further detail in Table 1.

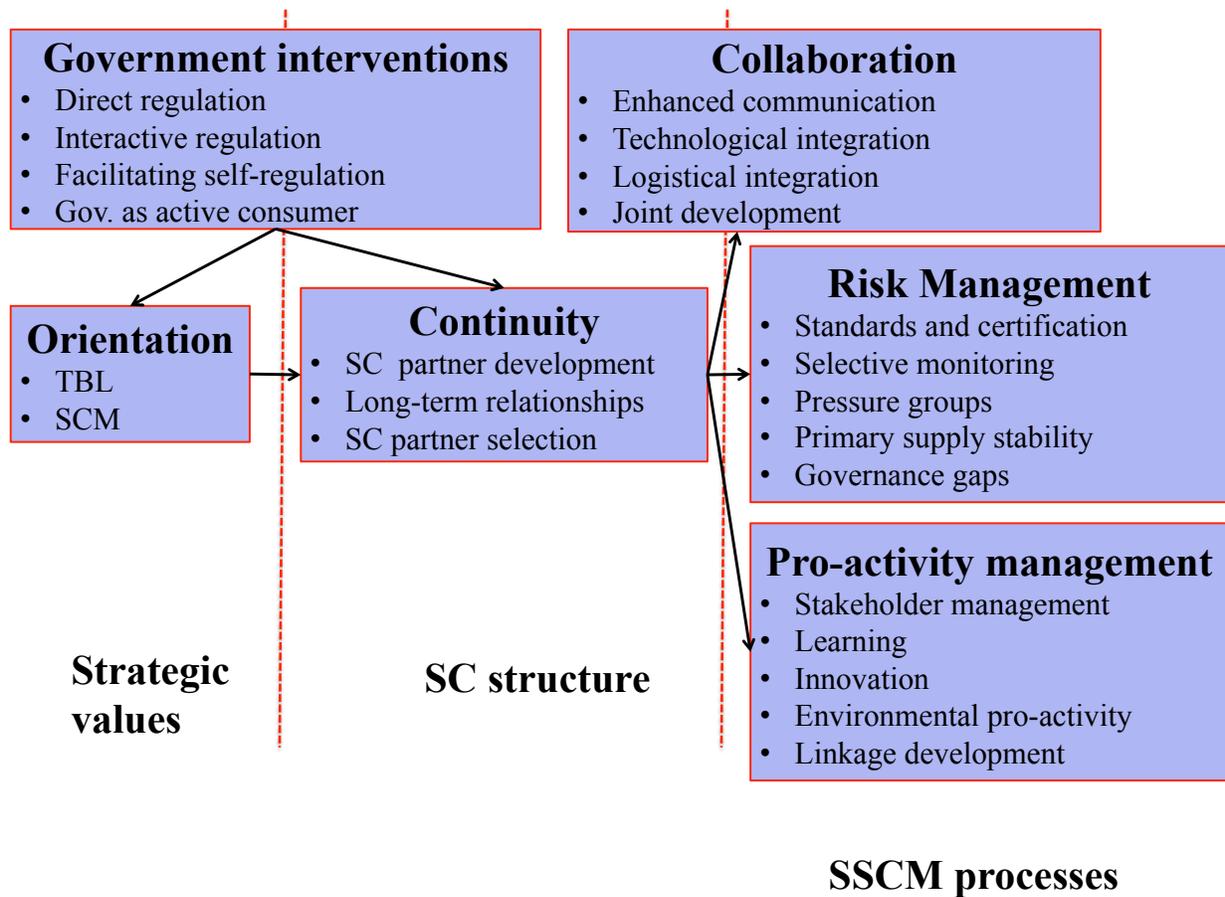


Figure 3 Framework of sustainable supply chain management of minerals (from Sauer and Seuring, 2017, p. 238)

Table 1 Category and Related Practices Overview (from Sauer and Seuring, 2017, p. 238)

Categories & Related Practices	Description
<p>*Government interventions</p> <ol style="list-style-type: none"> 1) Direct regulation 2) Interactive regulation 3) Facilitating self-regulation 4) Government as active consumer 	<p>Governments intervene in SC governance and operations by imposing legally binding direct regulations, interacting with and financing social society actors, and providing information and guidance to facilitate self-regulation. In addition, they can act as active consumers to build markets for more sustainable products and services.</p>
<p>Orientation</p> <ol style="list-style-type: none"> 5) Dedication to TBL 6) Dedication to SCM 	<p>Orientation centers on the strategic decisions of SC members to adopt the TBL and SCM practices to realize competitive advantages.</p>
<p>Continuity</p> <ol style="list-style-type: none"> 7) SC partner development 8) Long-term relationships 9) SC partner selection 	<p>Continuity draws on the SC structure and focuses on building long-term relationships with selected SC partners. Subsequent development of weak partners enhances overall SC performance.</p>
<p>Collaboration</p> <ol style="list-style-type: none"> 10) Enhanced communication 11) Technological integration 12) Logistical integrations 13) Joint development 	<p>Operational practices, such as enhanced communication and joint development, strengthen the collaboration among SC members, which is further facilitated by integrating logistical and technological structures.</p>
<p>Risk Management</p> <ol style="list-style-type: none"> 14) Standards and certification 15) Selective monitoring 16) Pressure groups 17) *Primary supply stability 18) *Governance gaps 	<p>Pressure groups targeting unsustainable operations in the SC represent major SC risks, which can be mitigated by monitoring suppliers and relying on standards and certification. Mineral SCs have to develop governance structures, since they often include weak governance contexts. In addition, it is important to stabilize primary mineral supplies, which have recently been subjected to substantial volatility and represent a supply risk.</p>
<p>Pro-activity management</p> <ol style="list-style-type: none"> 19) Stakeholder management 20) Learning 21) Innovation 22) *Environmental pro-activity 23) *Linkage development 	<p>Being pro-active in mineral SCs starts with developing linkages at the mine to share revenues with often-exploited local stakeholders. Managing stakeholder requirements enables learning effects, which stimulate SC innovation. Environmental pro-activity represents a further means to diversify from competitors and gain competitive advantages in mineral SCs.</p>

Chapter 3: Methods

3.1 Introduction

This chapter outlines the methodology used in the research and analysis. The objective of the study was to construct timelines of smelter participation and analyze the external forces and internal Smelter Engagement Team (SET) tactics that enabled or impeded smelter or refiner (SOR) participation in the CFSP. A convergent parallel mixed methods approach was adopted in order to answer the primary research question, *What external forces and internal tactics allow the CFSI and SETs to engage deeply in supply chains, beyond the visible horizon?*

The first stage of the research design involved investigating the engagement patterns of the smelters and refiners that participated in the CFSP. Descriptive data on smelters and refiners were sourced from the CFSI Smelter Database, a private database, made available by the CFSI. Details related to the smelters and refiners participating in the program such as active dates, site visit details, and outreach efforts on behalf of the CFSI to engage smelters in the CFSP, were explored. The data including the characteristics of the firms participating in the program were exported from the CFSI database into Microsoft Excel. These data revealed the number of days it took for a firm to become engaged in the CFSP.

The qualitative research design involved conducting semi-structured interviews in order to complement the analysis and interpretation of the data from the CFSI. Key informants included

current and former SET members, who are experts in conflict minerals, the electronics industry, and deep supplier engagement through their role in the CFSI.

3.2 Framework of Analysis

This research adopts Sauer and Seuring's (2017) framework for sustainable supply chain management of minerals. This framework was selected due to both its roots in broad sustainable supply chain management scholarship (Beske and Seuring, 2014) and its focus on the minerals sector. This framework also encompasses important themes of stakeholder theory, supply chain management, and business collaboration, for example, in its *Pro-activity management*, *Orientation*, and *Collaboration* categories, allowing for a systematic foundation for this research. Many of the elements in the framework, such as *Collaboration*, *Self-regulation*, *Long-term relationships*, *Learning* and *Selective monitoring* appear to be characteristic of the CFSI and its practices. Using this framework enabled, both, a structured dialogue with interview participants to identify which mineral sustainable supply chain management mechanisms they value, implement, and are challenged by, as well as, a guided framework to conduct deductive and inductive content analysis.

3.3 Research Design

A mixed methods research design was used for this study. According to Creswell (2014), a mixed methods research design combines qualitative and quantitative research and data in a

study. A mixed methods research design addresses the weaknesses of each method, as qualitative data can be open-ended, while quantitative data can be closed-ended (Creswell, 2014), and also “draw[s] upon the strengths of both quantitative and qualitative approaches” (Fetters, Curry, and Creswell, 2013, p. 2135).

This study employed a convergent mixed methods design. This approach involved concurrent collection of qualitative and descriptive data (Fetters et al., 2013). More specifically, this research employed a parallel convergent mixed method, where “qualitative and quantitative data collection occurs in parallel and analysis for integration begins well after the data collection process has proceeded or has been completed. Frequently, the two forms of data are analyzed separately and then merged” (Fetters et al., 2013, p. 2137).

The descriptive data was sourced from the CFSI Smelter Database, while the qualitative data was collected through semi-structured interviews with current and former CFSI SET members. The purpose of both approaches was to examine the external forces and internal CFSI/SET tactics that motivate corporations to engage deeply in their supply chains, beyond the visible horizons. The two forms of data were collected separately and then merged in order to produce one “narrative” that details the external forces and internal tactics that contributed to smelter participation in the CFSP.

The mixed method research design offered this study the best approach to evaluate the descriptive data with added qualitative context in order to produce detailed results that accurately represented the forces and tactics that factored into smelter and refiner participation in the CFSI.

A parallel convergent design was chosen as this design seeks to compare the descriptive and qualitative results through merging the two data sets. A merging method of integration was chosen, where merging takes place after the descriptive data was analysed and the textual data was qualitatively analyzed (Fetters et al., 2013). This integration was done through “joint displays” where the data was integrated “by bringing the data together through a visual means to draw out new insights beyond the information gained from the separate quantitative and qualitative results... [by] organizing related data in a figure, table, matrix, or graph” (Fetters et al., 2013, p. 2143). As a visual “narrative” could be presented that allowed for the timeline data to be contextualized by qualitative data, the joint display parallel convergent mixed methods design offered this study the most comprehensive data collection and analysis processes.

3.4 Timeline Data and Analysis

Descriptive data of the CFSI database (privately available and provided by the CFSI) explored the details related to the OEMs, smelters, and refiners participating in the program, site visit details, and outreach efforts on behalf of the CFSI to engage smelters in the CFSP. Smelters and refiners who are participating in the CFSP do so on a voluntary basis and knowingly provide their data for inclusion in the CFSI’s database. All identifying information linking data to OEMs, smelters, or refiners was removed to preserve the anonymity of the OEMs, smelters and refiners, and the individual interviewees.

Data describing all active participating SORs (n=323) were exported from the CFSI database into Microsoft Excel. The data points were mapped through time by active date in six-month

increments (i.e., the category 2010.2 describes the smelters that became active in the second half of the year 2010), and follows Na’s (2016) design. The characteristics of the SORs in the program were then analyzed, through the creation of pivot tables. These data were represented in two units: first, timelines of when smelters or refiners became active in the CSFP, and second, timelines comparing the percentage of active SORs that were participating in the CFSP to the total number of identified SORs. One timeline graph was produced for each of the four metal industries (tin, tungsten, tantalum, and gold) and one aggregated timeline was produced to represent all 3TG metals smelters and refiners. A summary of the 323 smelters and refiners is presented in Table 2.

Table 2 Summary of SORs in Research Sample

	Tin	Tantalum	Tungsten	Gold	3TG
N	83	44	46	150	323
Active SORs (as of 2017)	78	44	44	114	280
Inactive SORs (as of 2017)	5	0	2	36	43

3.5 Qualitative Research Design

Interviews were conducted to contextualize the results drawn from the timeline analysis and to identify nuances and challenges in the deep supplier engagement that allowed the SORs listed in the CFSP database to actively participate in the program.

3.5.1 Interviewees

Potential interviewees were recruited for this study through a combination of convenience

sampling and purposive sampling. Convenience sampling is the “selection of the most accessible subjects” (Marshall, 1996, p. 523). Purposive sample is the selection of “the most productive sample to answer the research question” (Marshall, 1996, p. 523), where “subjects are selected based on study purpose with the expectation that each participant will provide unique and rich information of value to the study” (Etikan, Musa, and Alkassim, 2015, p. 4). Etikan et al. (2015) states that “both convenience sampling and purposive sampling share some limitations which include non-random selection of participants, that is to say the researcher is subjective and bias in choosing the subjects of the study” (p. 4).

The interviewees were SET members recommended by CFSI. These contacts are industry experts in the fields of conflict minerals, and supplier engagement. Furthermore, they are, or were at some point, members of the CFSI and key members of one or more SETs. As such, these individuals were qualified candidates, with years of experience, and the potential to offer detailed expertise on the research topic. The interviewees approached include a cross-section of SET members with experience and knowledge in different regions and across different 3TG industries. They were individuals who were significant members in the SETs for several years. In total, 12 candidates were invited to participate in the study, resulting in six interviews being conducted.

The candidates were invited by email. In all 12 cases, the CFSI contacted them directly, with the information letter and consent letter (approved by the University of Waterloo’s Office of Research Ethics), which offered a detailed description of the research purpose and study, design, and invited the candidate to participate in a 60 minute semi-structured interview over Skype or

by telephone. After a candidate responded expressing interest in participating, a follow up direct email was sent to schedule the interview at a convenient time and over the interviewee's preferred communication method. After confirmation, the results of the descriptive data analysis – timelines of when smelters became active in the CSFP – were shared with the candidates. Interview questions were themed around these timelines.

Interviewees reviewed and provided signed consent forms, which assured confidentiality and anonymity of their participation in the study, as well as consent to audio recording of the interview. The interviewees were also informed of their legal rights to withdraw from the study at any time.

3.5.2 Interview Procedure

The main purpose of this research was to evaluate the external forces and internal CFSI/SET tactics allow the CFSI and SETs to engage deeply in supply chains, beyond the visible horizon. Through mapping the timelines of when smelters and refiners became active in the CFSP, peaks and valleys of SOR participation were identified. Contextualizing these findings, and developing a nuanced understanding of how engagement tactics and influential factors contributed to smelter and refiner participation in the CFSP, required industry expertise and detailed knowledge of the CFSP, the SETs, and conflict minerals.

Thus, semi-structured interviews were selected, in order to contextualize and clarify the timelines while still allowing the interviewees to speak to their personal experiences and nuanced perspectives. Semi-structured interviews were determined to be the most appropriate qualitative

data collection method, as they enable the researcher to explore the interviewees' own perspectives, point of view and emphasize the concepts or phenomena that the interviewee believes to be relevant and important (Bryman and Bell, 2015). Semi-structured interviews also allowed the researcher the freedom to ask follow up questions in order to gather detailed and comprehensive answers (Bryman and Bell, 2015). "As a result, qualitative interviewing tends to be flexible... responding to the direction in which interviewees take the interview and perhaps adjusting the emphases in the research as a result of significant issues that emerge in the course of interviews" (Bryman and Bell, 2015, p. 481). Semi-structured interviews allowed for guided inquiry into the patterns of external factors and internal tactics identified in the timelines, while allowing for flexible exploration of each interviewees' perspective of the important themes, outreach patterns, and challenges associated with deep supplier engagement. The University of Waterloo's Office of Research Ethics approved the interview questions, methods, and research proposal under ORE# 22601. The interview questions, found in Appendix A, inquired about the timelines in order to contextualize these findings. The order and context of the questions varied depending upon the interview.

A total of six interviews were conducted between January and March of 2018. Five interviews were conducted over telephone, and one interview was conducted over a dial in conference call system. The length of the interviews ranged between 30 and 60 minutes. Three of the six interviews were recorded and manually transcribed post-interview. Those that were not recorded (due to interviewee consent) were captured by detailed researcher notes taken during the interview, and edited for clarity post-interview.

3.5.3 Interview Analysis

The interview transcripts were imported into NVivo, a data analysis software, where they were analyzed and coded against Sauer and Seuring's (2017) framework of sustainable supply chain management of minerals (Figure 3). This served to evaluate the CFSI and the SET's deep supplier engagement and sustainable supply chain management tactics through the lens of the framework, in order to empirically test the framework to reinforce its themes or identify gaps in it. The content analysis methodology used was "a balance of deductive coding (derived from the philosophical framework) and inductive coding (themes emerging from participant's discussions)" (Fereday and Muir-Cochrane, 2006, p. 91).

The interviews were deductively coded to the appropriate practice or practices and then aggregated to the corresponding category or categories. This allowed references to be coded to all relevant categories and practices, and allowed for context to be maintained. Additional "Other" practices were added under each category, and a new "Other" category was created to allow themes not found in the existing framework to be coded appropriately. Inductive analysis of the references in the "Other" practices and category was conducted to identify common themes. These themes were then labelled as practices and grouped under the appropriate category. A new category was created when new practices were identified that did not fit within the existing the framework.

Coding of units was based on sampling units that depended upon the researcher to determine the unit that has meaning and can vary between words, sentences, or paragraphs (Stemler, 2001). After codes were assigned to each sampling unit, a summary of the code frequency was

determined and further analyzed. This followed the assumption that “quantification of data in content analysis [can be done]...by measuring the frequency of different categories and themes, which cautiously may stand as a proxy for significance” (Vaismoradi, Turunen, and Bondas, 2013, p. 404).

Chapter 4: Results

4.1 Timeline Analysis

The descriptive data were mapped onto timelines in order to identify trends in the smelter active dates. This study presents the timelines displaying when 3TG SORs became active members of the CFSP. 3TG metals as a group were analysed, followed by individual metal group. Pivot tables in Microsoft Excel were used to sort data by active date and metal group. The resulting timelines are graphs generated in Microsoft Excel. The timelines show peaks and valleys in SORs achieving active status and were used to guide the qualitative data collection. These timelines can be found in Appendix B.

4.2 Qualitative Results: Influences on SOR Participation in the CFSP

The results from the qualitative data collection and analysis are presented in this section. The purpose of the qualitative data analysis was to contextualize the peaks and valleys in the smelter active dates. The results were contextualized timelines with added qualitative context from the semi-structured qualitative interviews. The qualitative data was overlaid on these timelines in order to show important events that the interviewees identified as drivers or inhibitors of smelter participation in the CFSP.

3TG metals as a group were not analyzed in the interviews, as none of the interviewees presented information on 3TG metals as a whole, but rather spoke to their individual area of expertise. Accordingly, the individual analysis of each metal group is presented (Figures 4-7). The overlaid factors included identification of important events, external factors, or internal tactics that contributed to participation. The locations of the labels were an approximation of when the event or contributing factor occurred.

4.2.1 Influences on Tin SOR Participation

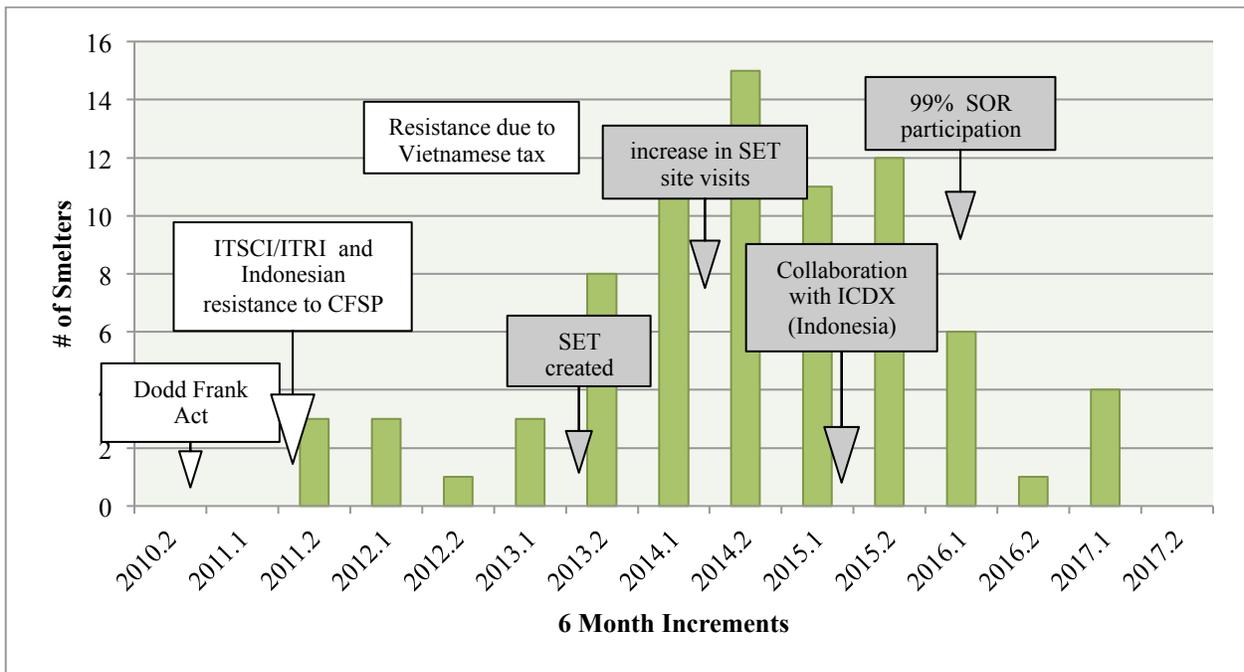


Figure 4 Influences on Tin Smelter or Refiner Participation in the CFSP. Overlaid boxes describe important events, external factors (white), or internal tactics (grey) that interviewees identified as contributing to SOR participation.

As seen in Figure 4, the 2010 Dodd-Frank Act was not a driving factor in motivating tin smelters or refiners from participating in the CFSP. This was explained by the low quantity of tin being sourced from the DRC, or covered countries. According to Interviewee 4, the majority of tin

smelters were not sourcing from the covered countries; therefore there was no urgency to participating in the CFSP. Interviewee 2 confirmed that since the majority of tin is sourced from Indonesia, this posed a challenge to get SORs to join a program that determines if they source from Central Africa. As Indonesia is a tin island, it did not make sense for Indonesian tin SORs to source from anywhere other than Indonesia (Interviewee 2). Additionally the CFSP faced some resistance from ITSCI (the ITRI Tin Supply Chain Initiative, an industry association) – as Interviewee 4 explained, *“the graph kind of indicates that [resistance], as far as early adopters, and the slowness given the number of tin smelters that exist. A lot of pushback from Indonesian tin smelters, a lot of pushback from [ITRI] members, and that made it a little bit slower.”*

Another factor inhibiting the participation of tin smelters, identified by Interviewee 6, was the existence of a tax law that created financial barriers and export challenges, which in turn created reluctance to participate in the CFSP:

“...we ran into the problem that the Vietnamese government has kind of like tax incentives for tin and tin production that weren't removed. So it was kind of like a tax reimbursement I think that they used for exporters of tin and a couple of years ago, they removed it so there's like 10 percent that refiners weren't getting back anymore and so that caused the smelters to stop exporting tin and just selling it to the local market. And so, once that happened, they were like we don't need [a CFSP] audit anymore because number one, we aren't exporting so it's not going to go into your supply chain and number two, this tax thing is really hurting our profitability and we can't be paying for an audit and worrying about an audit when we have this bigger problem...”

Interviewee 3 also identified that some local government policies inhibited SOR participation:

“There were some government policies and practices that mostly in the developing countries that kind of I would say... for example, called being conflict free would become more of a secondary factor for the smelters, because they were more into getting their licenses in place, their export licenses, which were changing every year... They would become more focused on their day to day production, dealing with government agencies, working on their taxes, the increase in taxes, so at times, these factors prevented, or

impeded them from driving from their goal of becoming conflict free or taking the CFSP program.”

However, government regulations in Indonesia were able to contribute to tin smelters becoming active participants in the CFSP, through active collaboration and engagement between the CFSP and the ICDX (Indonesia Trade Derivatives Exchange). Interviewee 6 explained that the CFSP successfully collaborated with the ICDX and that now, *“the ICDX made it a [legal] requirement for smelters to be [CFSP] compliant in order to be able to export tin from Indonesia”*.

Additionally, the creation of the SETs and their engagement tactics was instrumental in enabling tin smelters and refiners to participate in the CFSP. Interviewee 1 identified that the peaks in new participation in 2014 (Figure 4) correspond to an increase in site visits at this time. Interviewee 6 confirmed that, in addition to site visits, financial incentives (through the Initial Audit Fund) played a key role. Furthermore, the decrease in new participants joining the CFSP can be attributed to 99% smelter or refiner participation (as seen in Figure 4), which Interviewee 6 confirmed:

“The initial peaks [in 2013-2015] are caused by that outreach and basically going out there and offering a free audit and helping them but then it became even more constant because of that local law from the ICDX and the ministry of trade in Indonesia. And then the valleys...I’m not a hundred percent sure, but I think at least 99% of smelters in Indonesia that we know of are compliant and participating in the program.”

Interviewee 3 also spoke to the effectiveness of site visits:

“... tin smelters started getting active, when we as member companies started visiting smelters for the program... I think the SET team played a major role, face-to-face contact. Creating local SET teams also helped, because only the US and Canada initially, could not do the outreach that the local SET team is doing now. Breaching language, breaching communication or going to those places physically.”

Additionally, Interviewee 6 stressed the importance of cultural considerations underlying the effectiveness of site visits, when compared to tactics such as emails and phone calls.

In summary, participation of tin smelters and refiners in the CFSP was enabled by collaboration with local governments and the SET (and their financial incentives and site visits). Participation was impeded by tin sourcing practices, industry resistance, local tax laws (which led to financial and export barriers), and language and cultural barriers.

4.2.2 Influences on Tantalum SOR Participation

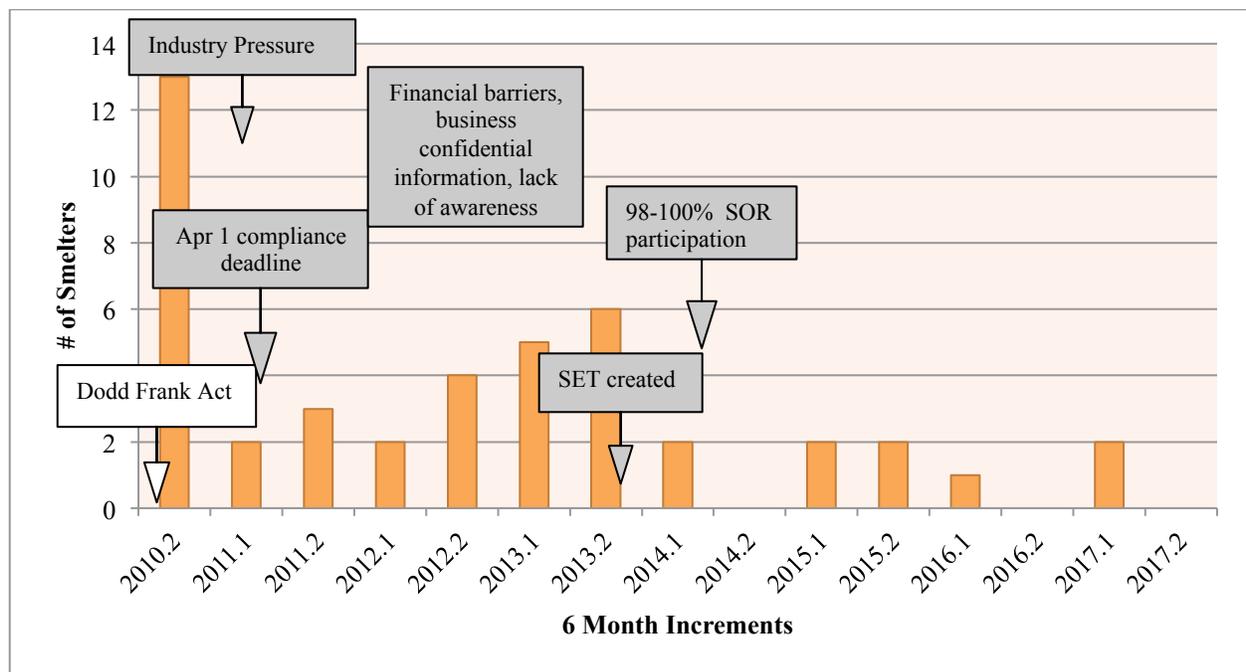


Figure 5 Influences on Tantalum Smelter or Refiner Participation in the CFSP. Overlaid boxes describe important events, external factors (white), or internal tactics (grey) that interviews identified contributing to SOR participation.

The 2010 Dodd-Frank Act was a driver for the increase in tantalum smelters and refiners becoming active participants in the CFSP. Interviewee 1 spoke to the influence of the electronics

industry in exerting market pressure to convince smelters and refiners to participate in the CFSP.

Interviewee 4 elaborated that in the tantalum space, the electronics industry

“ had the leveraging ...[to] apply the pressure that we could... once we had, there were a couple other smelters that were under pressure that came into line very quickly, and that's why if you look at the second half of 2010, you see a big jump in the tantalum smelter participants, and so that got the ball rolling... And so with tantalum you see continued growth...I don't know who the final ones were but they finally had enough pressure to come on. But that's why you had such a high level participation early on with the tantalum, because the [downstream electronics] industry that was driving the initiative had a power to and the leverage and the purchasing power to influence that.”

Interviewee 4 also identified that engagement and outreach efforts to work with stakeholders and pressure groups contributed to enabling tantalum smelters and refiners to participate. These stakeholders initially included electronics industry members, but expanded to include civil society members, global witnesses and governments. Additionally, Interviewee 4 stated that there was an April 1, 2011 deadline, after which all suppliers sourcing outside of OECD compliance schemes would not be listed as conflict-free.

There were, however, a number of barriers that inhibited tantalum smelters and refiners from participating in the CFSP. Interviewee 4 identified these factors:

“Concerns - cost- concerns with regard [to] business confidential information, the origin of their minerals, lack of awareness, not realizing that even though they're not in the US, Dodd-Frank does impact them...and then some that were sourcing from the Congo and couldn't pass. Because it was obvious that things were leaving the Congo still, that weren't either validated or being smuggled. And/or there wasn't the pressure from supply chain, depending on where they were located, who their customer base was, they might not have had pressures...”

However, despite these barriers, both Interviewee 1 and Interviewee 5 stated that tantalum was the metal group where downstream market pressure resulted in 100% participation of the

upstream smelters and refiners and thus achieved the highest CFSP participation rate across the 3TG industries.

4.2.3 Influences on Tungsten SOR Participation

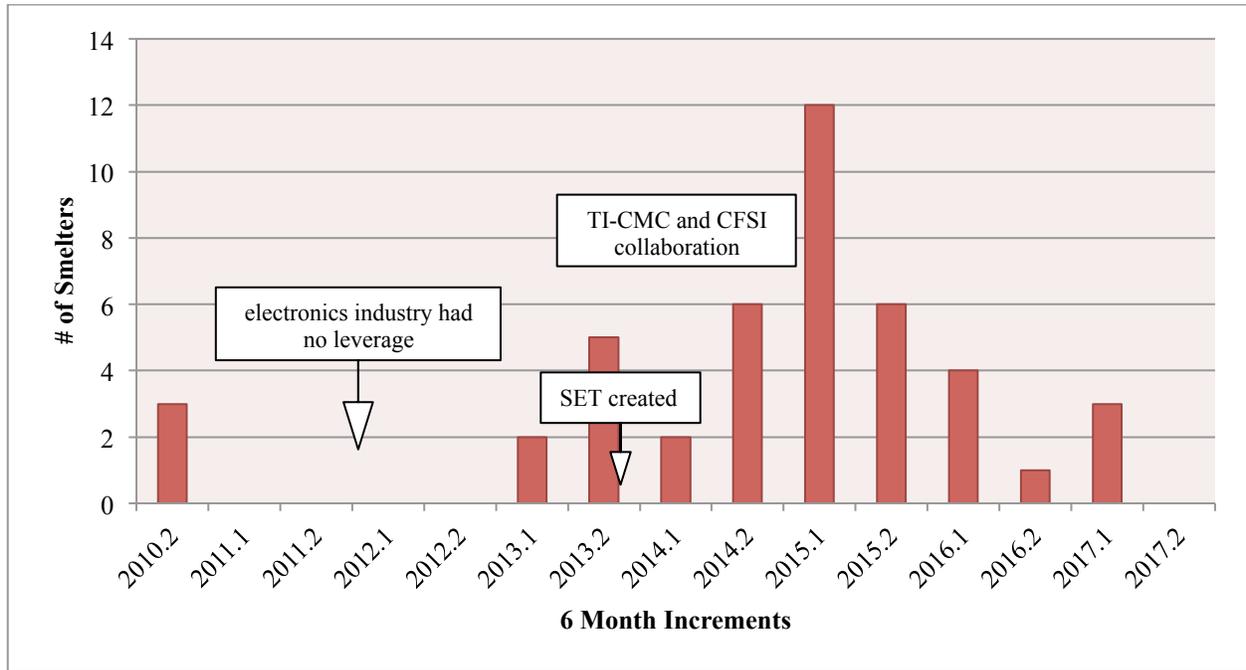


Figure 6 Influences on Tungsten Smelter or Refiner Participation in the CFSP. Overlaid boxes describe important events, external factors (white), or internal tactics (grey) that interviews identified contributing to SOR participation.

Figure 6 shows that the tungsten smelters or refiners took longer to become active participants in the CFSP compared to those in other 3TG industries. According to Interviewee 4, the initial lag in participation was due to the electronics industry having little to no leverage in the tungsten market. The increase in participation, according to Interviewee 4, did not occur until 2013, which corresponds to when the SET was created and was able to exert concerted pressure. Interviewee 4 noted that, *“tungsten was really late to the table and such a small amount of tungsten actually came out of the region, they just didn't really want to engage”* and that it was the SET tactic of

financial incentives (the CFSI funding of the Initial Audit Fund, which paid for tungsten SOR first audits) and collaboration with the tungsten industry association (TI-CMC) which enabled the CFSI to overcome these impediments. Interviewee 2 also agreed that gaining help from the tungsten industry association was essential. Interviewee 1 elaborated that the tungsten association negotiated a three year time period between audits, thus requiring tungsten SORs a longer audit validity period than for other 3TG industries. This overcame another financial barrier impeding tungsten SORs from participating in the CFSP.

In summary, participation of tungsten smelters and refiners in the CFSP was enabled by CFSI collaboration with the tungsten association and the SET (through financial incentives). Participation was impeded by initial financial concerns, tungsten sourcing practices, and lack of leveraging power by the electronics industry resistance.

4.2.4 Influences on Gold SOR Participation

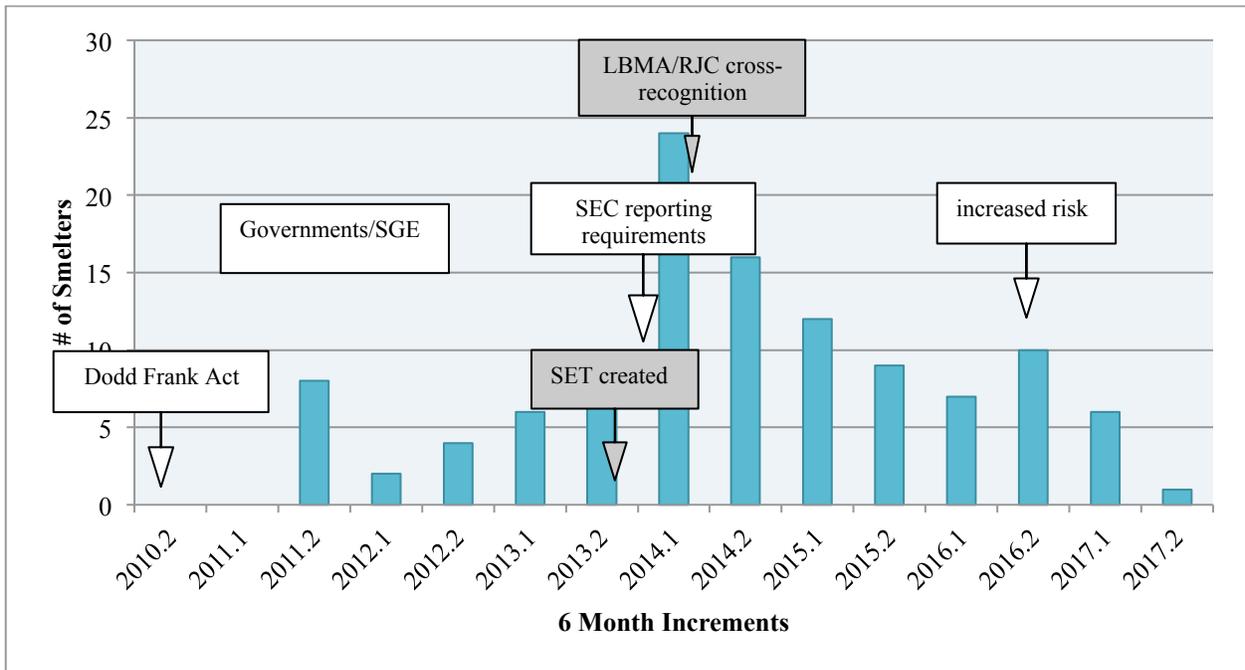


Figure 7 Influences on Gold Refiner Participation in the CFSP. Overlaid boxes describe important events, external factors (white), or internal tactics (grey) that interviews identified contributing to SOR participation.

Figure 7 shows the influences on gold refiner participation in the CFSP. Interviewee 5 stated that the increase in participants in 2014 is due to the introduction of the SEC reporting requirements, where downstream OEMs began collecting information on and reporting their sourcing practices to the CFSI. Interviewee 1 explained that among the 3TG metals, gold SORs were the most challenging to engage, and where SET tactics were the least successful. Interviewee 1 elaborated that these challenges are, in part, due to numerous non-industrial uses for gold, such as in jewellery and bullion, which account for about 80% of gold use. Interviewee 3 echoed this, stating that, “gold refiners are mostly in jewellery which is not in electronics. Electronics like our companies form a very low percentage. [The electronics industry] driving it was initially not as effective, because they kind of felt because they could pass away with [the CFSP] even if we

didn't do business with them". Interviewee 6 agreed and added that *"gold is a completely different animal"* as there is not *"that much gold in the electronics industry"* and *"the electronics and electronics industry associations don't have that much leverage with gold"*. Additionally, Interviewee 6 identified gold as being a *"harder metal to tackle"* as it *"can be recycled and [is] typically recycled and it's really hard to track and the quantities are much smaller for bigger profit...[and it is] such a big part of jewellery people aren't totally clear or aren't aware of the issues"*. Furthermore, Interviewee 5 spoke about difficulty in upstream supply chain management, adding that many SORs do not realise it is a supply chain all the way down to the raw material and that it is new that downstream companies are becoming more responsible for the entire supply chain. Interviewee 3 also confirmed that there is low supply chain visibility in the gold industry:

"It is very difficult to track the source of the gold, the chain of custody. It is a precious metal and can be smuggling and can be caught in small quantities. However, I think gold refiners and smelters are getting into place now, they are understanding why they need the chain of custody so hopefully we see more of these refiners getting into this program."

The Shanghai Gold Exchange (SGE) was identified as a key barrier to gold refiner participation in the CFSP. Interviewee 1 identified that in China, gold is sold and traded by banks, and as such, suppliers only identify the banks as their customer, and not the downstream OEMs asking for these audits. Interviewee 4 reinforced that the SGE plays a role in decreasing upstream supply chain visibility. Additionally, according to Interviewee 1, the SGE is not active in due diligence. Interviewee 2 echoed this, adding that as long as smelters in China abide by SGE policies, anything outside those rules is seen as unnecessary. Furthermore, there is added difficulty in convincing refiners that source gold from mines in China to join an (American) program that determines whether they source from Africa.

Interviewee 4 identified that another barrier impeding gold refiners from participating in the CFSP, is local government efforts to create legal trading channels:

“In the gold space, illegal gold is worth more than legal gold, and there's a number of reason for that, one, they're not paying the taxes on it, so miners actually get more per gram of gold through illegal channels than they do through legal channels... its also used as currency, its used to wash money, so there's a higher value for the illegal stuff. So that's another challenge on the ground that gold has and that's why there's very little artisanal gold going to any of the compliant smelters, if any.”

The interviewees also identified that there were a number of factors that helped facilitate the participation of gold refiners in the CFSP. Interviewee 6 explained that in order to build supply chain visibility and identify gold refiners the SET employs a “*two fold approach*” of supplier engagement, followed by smelter engagement:

“The first way we do it is through a supplier engagement. So [OEMs] conduct a supplier survey every year, we ask them to tell us what smelters are contributing to their products...So when they report those smelters, we ask them to engage with their supply chain so that they can convince people to join the program. This... can be a bit tricky because we are so far removed from the smelter itself and even our direct suppliers are removed from the smelter itself so that can be challenging twisting through the supply chain. So the second way is through the smelter engagement. After we conduct the survey we find smelter contact information and directly go talk to them, and...engage with the smelters. So we either try to email them, try to call them, and then meet them in person. We find that's the most effective way to get them engaged and this can be done by going directly to the smelter facilities and then another way is to go to conferences where we know the smelter representatives are going to be and try to sit down with them to talk. So in terms of how smelters become active I think the most important thing is being very engaged and having not only your company brand but establish, trying to establish a face to face relationship with the smelters, because that way they understand that we want them to be successful and that we're going to help them be successful.”

Interviewee 3 elaborated on the importance of networking and participating in gold industry conferences:

“We attended more of the conferences, gold conferences that were held... So we attended wherever we could to get more refiners at one place, kind of held sessions on the CFSI during these conferences...This was another tactic that we used and it definitely helped,

because conferences easily give us face-to-face meetings with most of the refiners and smelters.”

Interviewee 1 also identified that leveraging contacts such as traders, researchers, associations, or nearby companies that knew a refiner helped legitimize the calls and emails sent by the OEMs that are a part of the CFSI. Interviewee 5 elaborated, adding that trade, legislation requirements, pressure from civil society and NGOs, and pressure from the jewellery and sustainability industries were key to convincing gold refiners to participate in the CFSP. Additionally, Interviewee 5 stated that direct customers and prominent OEMs have the most pressure and probability to guide refiners and to motivate them to be part of the program. Interviewee 3 also spoke to the importance of leveraging industry pressures, as *“in the gold industry there is a lot of competition. So when one of the gold refiners become active and they are [public] ... the other refiner tends to agree to the program and wants to go through the program”*. Interviewee 5 echoed that networking was key to identifying smelters and then engaging in outreach efforts, stating that in gold, everyone knows everyone and that this is important to leverage. Additionally Interviewee 5 identified that building trust was key to develop fruitful discussions. Interviewee 1 also identified site visits played a large role in helping to build capacity of the smelter to undertake the audit process. However, Interviewee 1 explained that SET tactics that achieved gold smelter and refiner active status varied by region. For example, in Indonesia, participation in conferences and networking with active refiners to identify and engage with other gold smelters was key, while those same tactics might or might not work in other regions. Interviewee 5 stated that it is important to be part of the local culture and speak the local language.

Interviewee 1 stated that another factor was leveraging relationships with the LBMA and RJC - specifically in 2014 when the CFSP began cross-listing refiners that were listed as compliant to

LBMA or RJC programs. Since the electronics industry makes up a small percentage of the global use for gold, these partnerships allowed the CFSP to overcome their inability to apply market pressure onto gold refiners. Interviewee 1 elaborated that the LBMA, which conducts purity audits, introduced a responsible gold audit. Interviewee 2 also spoke to the success the SET found with gold smelters or refiners through the industry associations. Interviewee 5 also added that cross listing with the LBMA and RJC was one of the main pathways gold smelters and refiners took to achieve active status with the CFSP. Interviewee 4 reinforced that mutual recognition of RJC, CFSI, and LBMA compliance was a successful tactic in achieving gold smelter and refiner participation in the CFSP. Interviewee 6 echoed this:

“The very high peak in 2014 was probably when we started working with LBMA and RJC...[The LBMA has] a good delivery list for gold, so sometimes when a smelter isn't really interested in the electronics industry they will be interested in the gold industry as a whole or jewellery industry so we can get a lot more traction when we get the associations on board with what we are trying to do...So when we've engaged with the industry associations like the LBMA or the RJC...we've been able to get bigger groups of smelters engaging in the free audits, because then that's better for their brand and they truly believe it's going to help their business whereas maybe the [CFSI] audits doesn't really mean that much to them because gold is so different”

Another factor contributing to gold refiners achieving active status, identified by Interviewee 1, was that the SET created a sub-team for gold. Furthermore, Interviewee 6 explained that within the Gold SET, there were additional efforts to manage smelter engagement (especially mass outreach) from the beginning of the engagement process to when the SOR achieved compliance:

“...When we have a smelter that needs outreach we pick a person within the team that's going to be responsible for that smelter and we call them the “single point of contact” or SPOC because obviously we have hundreds of companies that have to deal with these conflict minerals, filing and reporting, and everybody want the smelter to be active and then compliant. So we found that that sometimes when too many companies are trying to reach the smelter or communicating with the smelter it can cause confusion and they eventually stop responding ... we realized that we understood that it was probably better to assign one [CFSI] member company/person to engage with the smelter and so that smelter knows exactly who they can go ask questions to, exactly who they need to send

documentation to and that has worked out really well because that's the way you establish the relationship with refiner.”

Interviewee 4 agreed that the SET was tactical and strategic about engagement, however, in contrast to Interviewee 6, added that mass outreach was successful and *“helped drive some of the participation”*.

4.3 Qualitative Results: Empirical Testing of Framework

The second set of results from the qualitative data collection and content analysis are presented in this section, where the frequencies of codes are summarized and further analyzed. The purpose of the qualitative data analysis was to identify trends in smelter participation and the themes found in the deep supplier engagement tactics utilized by the SETs to engage with smelters.

The purpose of conducting semi-structured qualitative interviews was to contextualize and clarify the timelines while still allowing the interviewees to speak to their personal experiences and nuanced perspectives. The interviewees were able to contextualize these findings, and provide a nuanced understanding of how engagement tactics and influential factors contributed to smelter and refiner participation in the CFSP. The framework (Sauer and Seuring, 2017) was used to deductively perform the content analysis of the transcribed interviews. An inductive approach was taken to identify themes emerging from the data (Fereday and Muir-Cochrane, 2006) that were outside the framework. The results of the content analysis are presented in Table 3.

Table 3 Content Analysis of Qualitative Data

Category/ Practice	Code Frequencies	Interviews	Key Concepts	Example (Interviewee #)
Risk Management	350	6		
Pressure groups	173	6	- Industry associations - Market pressure/ Industry leverage - Civil society groups/NGOs - Downstream OEM pressure	Pressures from civil society (5)
Standards and certification	80	6	- Management system - Certified/ compliance	“The ICDX made it a requirement for smelters to be RMI or RMAP compliant in order to be able to export tin” (6)
Primary supply stability	75	6	- Sourcing - Primary mineral supply	“Tungsten was really late to the table and such a small amount of tungsten actually came out of the region, they just didn't really want to engage” (4)
Governance gaps	22	4	- SC Governance	“And created the Conflict-Free Sourcing Initiative, created its own governance structure” (4)
Selective monitoring	0	0		
Collaboration	197	6		
Joint development	96	4	- Mutual benefits - Capacity building - Cross-recognition	“You have a much larger group of industries that's covered that can apply greater pressure” (4)
Enhanced communication	94	6	- Engagement/ outreach (Emails, letters, phone calls, site visits) - Networking/Trust	“We as member companies started visiting smelter for the program” (3)
Logistical integration	4	1	- Improving infrastructure	Leveraging and improving existing infrastructure (1)
Technological integration	3	1	- Technology adoption	“Some were not too tech savvy, which prevented them from getting into the system” (3)
Continuity	178	6		
SC partner development	77	6	- Convincing - SPOC - Initial audit fund	Then they start engagement through outreach program and try to motivate the smelter to be part of the program (5)
SC visibility	63	6	- SC visibility - Research (ex. conferences) - Transparency (information sharing)	“It is very difficult to track the source of the gold” (3)
SC partner selection	28	5	- Confirm SORs - Smelter Disposition Team	“Identifying those intermediates and separating them from actual gold refiners” (6)
Long-term relationships	10	4	- Retaining SORs	“Now it's more of a matter of retention” (6)

Category/ Practice	Code Frequencies	Interviews	Key Concepts	Example (Interviewee #)
Government interventions	93	6		
Direct regulation	64	6	- Dodd-Frank Act - Legislation/law	The presence or absence of regulations (2)
Interactive regulation	13	4	- Complementing OEM efforts - Collaboration	We also worked closely with government bodies that managed these metals (2)
Government as active consumer	11	4	- SGE	“One of the biggest industry associations we’re trying to work with is the Shanghai Gold Exchange” (6)
Facilitating self-regulation	5	3	- Refiner list	“The government or government associations have collaborated with the CFSP to get smelters to do the audit”
Contextual Dimensions	78	6		
Unique Industry Considerations	41	6	- Different/unique	The gold sector is the most risky sector (5)
Liability of Foreignness	37	6	- Cultural/ language barriers - Regional differences	It also important to be part of the local culture and speak the language of the local country (5)
Pro-activity management	56	5		
Learning	21	5	- CFSI learning/ improvement - Education/awareness - Lack of understanding	“Understanding from a Conflict-Free Sourcing Program what did we need to change, or do differently” (4)
Sustainable pro-activity	18	2	- Action orientation - Goal oriented	“We all agree at the end of the day that we need to do something” (4)
Innovation	12	3	- New sustainability strategy	Difficult, no guidebook (5)
Linkage development	3	2	- Developing linkages at the mine	“We worked with a mine site... and helped pull material through the system” (4)
Stakeholder management	2	2	- Stakeholder management	“We tell them what are the ... stakeholder and customer requirements for each company” (3)
Orientation	31	5		
Dedication to SCM	31	5	- Voluntary action - Corporate social responsibility - SCM as a priority	“There were a few companies, especially electronic companies, who as a part of their social responsibility program wanted to try responsible sourcing or conflict free sourcing” (3)
Dedication to TBL	0	0		

The deductive content analysis identified that the most frequent sustainable supply chain management practices were *Pressure groups* (173), *Joint development* (96), and *Enhanced communication* (94). Other frequently identified practices include *Standards and certifications* (80), *SC partner development* (77), and *Primary supply stability* (75). Interesting findings include that *Direct regulation* was the most identified *Government intervention*, and that in the *Orientation* category, only *Dedication to SCM* was identified. The inductive content analysis identified the practice of *SC visibility*, which falls under the *Continuity* category. Additionally, the inductive content analysis identified a new category – *Contextual dimensions*. This category houses the practices of *Liability of Foreignness* and *Unique industry considerations*, both of which were identified in all six interviewee responses.

The data was also visually organized in a tree map (Figure 8), a diagram that displays the “hierarchical data as a set of nested rectangles of varying sizes” (“Hierarchy charts, 2018), and generated in NVivo. In Figure 8 relative size was used to represent the frequency of coding.

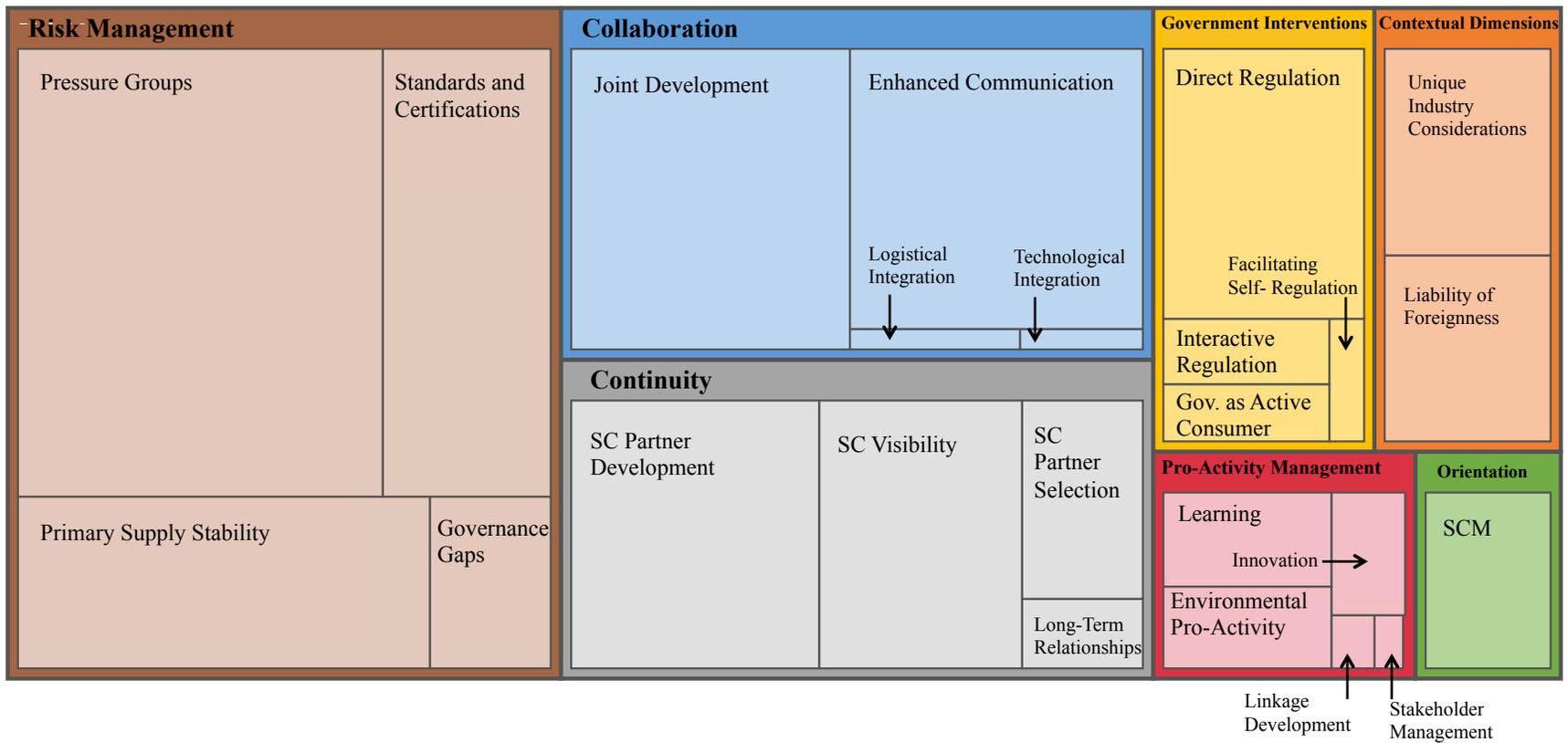


Figure 8 Tree Diagram of Coding Frequencies Represented by Relative Size (based on interview data)

4.3.1 Risk Management

The category of *Risk management* contained the most number of references. The most frequent practices referenced by interviewees were *Pressure groups* (173) and *Standards and Certifications* (80), followed by *Primary supply stability* (75), and are further explained below. As the practice of *Selective monitoring* was not found in the interviewees' responses and the practice of *Governance gaps* was identified infrequently, they will not be further explored.

Pressure groups

The practice of *Pressure groups* was the most identified practice, both within the category of *Risk management*, and the framework as a whole. There were a number of different supply chain agents that the interviewees identified as exerting pressure onto smelters and refiners in order to convince them to participate in the CFSP, including OEMs, industry associations (LBMA, RJC, etc.), civil society, NGOs, traders, smelters and refiners, global witnesses, and governments.

Interviewee 5 stated that important agents that exert pressure onto smelters and refiners include legislative requirements and pressures from civil society and NGOs, jewellery and other industry pressures. Interviewee 1 also stressed the importance of leveraging a gatekeeper who knew the smelter (such as traders, or leaders of associations, or a nearby company) in order to apply pressure and achieve active status of that smelter. However, Interviewee 5 stated that direct customers, such as OEMs and banks, have the most pressure and probability to guide SORs and to motivate them to be part of the program. Interviewee 2 agreed, stating that as direct customers, when multiple large companies were able to put pressure on the upstream smelters and refiners, they were effective in pushing SORs to active status. Both Interviewee 1 and Interviewee 2

believed that leveraging the tin and tungsten industry associations as well as working closely with governments that managed 3TG metals were effective tactics.

Multiple interviewees spoke to the pressures exerted by the CFSI member firms and the SET members onto SORs being successful in achieving smelter and refiner participation. Interviewee 6 stated that *“when a smelter sees that all these companies are asking for them to join and then you combine that with the face to face interaction and the hand holding of getting them ready for the audit then they're more likely to be successful”*. Interviewee 4 identified that the absence of supply chain pressure was a factor that impeded smelters and refiners from participating in the CFSP, and elaborated on the importance of the SET outreach in applying pressure to SORs: *“...[the SET] started to be more tactical and strategic about engagement...direct pressure could now be applied because they understood which suppliers of theirs were using these smelters”*. When it came to market pressures, Interviewee 1 stated that industry demand was able to get a 100% participation rate in tantalum SORs because a majority of the tantalum SORs are part of the electronic industry. Interviewee 4 agreed, identifying the NGO and regulatory pressures driving the CFSI's efforts, and stated that the tantalum space, *“is where [the electronics] industry had the greatest leverage... [as] the electronics industry used I think roughly 60% of the world's tantalum, so we had a lot of leverage there through a couple major buyers”*. Interviewee 4 also spoke to the need of having multiple sectors, such as *“aerospace, automotive, medical devices, jewellery”*, apply pressure to smelters and refiners. For example, Interviewee 1, Interviewee 3, and Interviewee 6 discussed that since the use for gold by industry is primarily jewellery and banks and the electronics industry makes up a small portion, the SET needed to work with associations such as the LBMA, the RJC and SGE in order to find success.

Standards and certifications

The practice of *Standards and certifications* was the second most identified practice under the *Risk management* category. This category was coded to references to the development of the CFSP and to referenced standards and certifications as factors driving or inhibiting smelter and refiner participation in the CFSP.

In developing the CFSP, Interviewee 1 stated the importance of cross-listing the CFSP and LBMA. Interviewee 5 expanded on this, stating that gold refiners who believed that they would not see any positive effect in the CFSP, wanted to be LBMA compliant because they believe that LBMA will get access to international markets. Interviewee 3 also mentioned the role *Standards and certifications* played in driving competitiveness for market access, especially in the gold industry. However, Interviewee 4 identified that success of *Standards and certifications* (along with legislation) are dependent upon the specific industry: “*within the 3T space, given the closed pipe systems, untagged material was discounted. And so if you were trying to cheat the system, your bag of tantalum or tin was worth less if it didn't have a tag*”, adding, however, that in the gold industry “*illegal gold is worth more than legal gold*”.

Standards and certifications played a role in motivating smelters and refiners to become active and then compliant participants in the CFSP. In developing the CFSP procedures, Interviewee 5 stated that in order to get active status smelters and refiners needed to sign the audit agreement as a precondition on active status. Interviewee 1 described that by leveraging the published smelter list – which identifies smelters and refiners that were active, inactive, and compliant – the SETs were able to motivate suppliers to participate so that they could be on the next quarterly list.

However, as Interviewee 1 describes, this tactic did not work all the time, since some smelters did not see the impact on their bottom line of being publically listed as compliant. Leveraging compliance to *Standards and certifications* as a way to access international markets, was another tactic. This applies particularly to tantalum and to tin in Indonesia. Interviewee 1 stated that it is very difficult to sell tantalum unless the smelter or refiner is listed as conflict-free and Interviewee 6 spoke to this tactic being utilized in collaboration with legislation in the tin industry as “*the ICDX and RMI collaborated and the ICDX made it a requirement for smelters to be [CFSP] compliant in order to be able to export tin from Indonesia.*”

In contrast, weak standards and certifications inhibited some 3TG SORs from participating in the CFSP. Interviewee 2 stated that Chinese gold smelters and refiners abide by SGE policies and resist other certifications as they are seen as unnecessary. Additionally, in the case of tin, the associated costs of the *Standards and certifications* inhibited participation, as Interviewee 3 stated “*...called being conflict free would become more of a secondary factor for the smelters, because they were more into getting their [export] licenses in place*”.

Primary supply stability

The third most identified practice within the category *Risk management*, was *Primary supply stability*. *Primary supply stability* was coded to interviewees’ responses that referenced suppliers’ needs to ensure security of their mineral supplies and access to markets. Interviewee 1 identified that by leveraging access to markets, the CFSI was able to get 100% of tantalum smelters and refiners aligned very quickly, because so much of them were a part of the electronics industry. Interviewee 4 echoed this stating that in the tantalum supply chain:

“we don't want to not support legitimate sourcing from the region. So we made sure that there was elements in our program to allow and facilitate in-region sourcing.... to make sure we could allow legitimate, validated conflict free material into the international markets... to make sure we could manage this and that we did not create any de facto embargo of material out of the region.”

Interviewee 3 and Interviewee 6 spoke to *Primary supply stability*, when stating that in the tin industry local tax laws in Indonesia forced SORs to focus more time and resources on their day to day production to ensure profitability, such that their goals of becoming conflict free or participating in the CFSP became secondary. Additionally, both Interviewee 3 and Interviewee 6 stated that being compliant and listed as conflict-free was also secondary to small smelters and refiners. When speaking about the gold industry, Interviewee 4 added *“threats of either change or lose business”* were effective tactics employed by the SETs in order to achieve smelter and refiner participation in the CFSP. Interviewee 3 also spoke to competition between gold suppliers for market access serving as a driving factor that enables gold smelters and refiners to participate in the CFSP.

Additionally, Interviewee 2 stated that if a smelter or refiner was sourcing from a non-covered region, it was a challenge to get smelters and refiners in regions where they are mined, to join a program that determines if they source from Central Africa. Interviewee 1 provided Indonesia as an example, stating that to Indonesian tin smelters and refiners, it did not make sense to source from anywhere other than Indonesia. Interviewee 4 echoed this phenomenon when describing the tungsten industry's reluctance to participate in the CFSP stating:

“...the tungsten industry said do not source from the DRC. And so they actually did create [an effective or default] embargo by taking their position. "Oh we're not sourcing from the region, it's too expensive, it's not worth our effort. We get so little from that, why do we need a whole due diligence program, [when] we don't source from the region”.”

Interviewee 4 also stated that the CFSI encouraged market access for smelters and refiners, through the initial audit fund, and the CFSP audit policy:

“The early adopters fund, which was a couple of companies came together and provided funding to help offset the cost of the audit... But that transition into the fund that now exists that pays for the customer's first audit...they then had, if you pass your first two audits, and you don't source from the covered countries, you can get an audit once every three years, and so that enticed people who don't source from the region to say hey you know this is way too expensive, but if you cut your costs by a third, it becomes, your cost to global market access is much lower and makes good business sense.”

Interviewee 5 identified the cross-recognition with the LBMA as a factor that leveraged market access when encouraging smelters and refiners to be part of the CFSP, stating that smelters and refiners gave the SET indication that they would not see any positive effect in the CFSP, but they wanted LBMA compliance because they believe that will get them access into international markets.

4.3.2 Collaboration

The category of *Collaboration* was the second largest category based on number of references in the qualitative data. The most frequently mentioned practices were *Joint Development* (96) and *Enhanced Communication* (94), which are explored in detail below. Due to infrequency of mention in the interviews, the practices of *Logistical integration* and *Technological integration* will not be further explored.

Joint development

The practice of *Joint development* was the most frequently identified practice in the *Collaboration* category. The foundation of the CFSI was, as Interviewee 4 describes, the joint effort of EICC and GeSI:

“...And that's the joint effort of EICC and GeSI- they came together and created the Extractives Working Group... and they started formulating a process... Then we kind of formalized and created the Conflict-Free Sourcing Initiative, [and] created its own governance structure. And so, but I think there was a lot of supply chain collaboration occurring, there's communications to the civil society organizations, the NGOs, that were monitoring these activities. And so there was an upward momentum of pressure to continue to advance, to get greater participation.”

Interviewee 1 identified that through the CFSI, member firms were given flexibility in how and to what degree they participated depending upon the commitment and resources they had available. For example, some member firms were comfortable talking to governments, others had the budget to travel, and others sent emails and conducted phone calls. Interviewee 1 stated that the collaborative nature of the CFSI and the SETs included *Joint development* and capacity building because without the SETs, each member firm could have contacted industry representative, smelters, and refiners on their own, providing them with different information, and leveraging what they could. However, Interviewee 1 added that banding together created a lot of efficiencies and built capacity. Additionally, Interviewee 1 spoke to *Joint development* when stating that member firms often spoke with smelters and refiners that were not part of their own supply chain, but were nonetheless satisfied to contribute to the greater benefit of the CFSI.

Interviewee 5 also spoke to *Joint development* with cross-recognition of prominent and influential industry associations. In the gold mineral industry, the CFSI chose to work with the LBMA and RJC, a decision that led to an increase in gold smelters and refiners participating in the CFSP. Interviewee 6 also elaborated on the collaboration between the CFSI and industry associations as being successful in SORs engaging the free audits. When asked to describe the factors that enable smelters to participate, Interviewee 4 echoed that “*collaboration with members of the supply chain*” such as industry members, civil society members, and

governments was important. Interviewee 4 continued, explaining that the collaboration of the CFSI's member firms was novel, as these firms are competitors in a very competitive industry:

“The only thing I would say, when we talked about the supply chain collaboration, there are examples where [two companies] participated together, and they're like mortal enemies, competitors to each other. And I think also... the tantalum industry was very a vicious industry without much collaboration. But when [the CFSI] came out, and this is where we saw a lot of collaboration occurring, which I think did surprise a lot of folks.... And the electronics industry is actually very competitive, and they do like to outdo each other...[and] nothing [like the CFSI] existed out there, and so, nobody had invested interest at the point of time we were implementing.”

Interviewee 4 also added that the collaborative nature of the CFSI has spread beyond member firms, industry associations, and those within the mineral supply chain, to now include multiple industries, and that the 2010 Dodd-Frank Act and cross industry collaboration helped overcome barriers associated with multi-industry uses of gold:

“And we... started off as the electronics industry joint effort of EICC and GeSI and we realized for us to be successful, we needed to open to other industry. And that's why we very quickly... allowed other entities and industry associations to participate and ...allowed them a seat at the table. And also Dodd-Frank was multi industry, so that allowed us, they could no longer hide, they're going to have to meet their failings, they're going to have obligation to import, to disclose... I think now GeSI and EICC still account for initially is about 120 but there's over 200 not-EICC/GeSI members, so now its swung to non-electronics or non-large electronics companies, that are in the space, aerospace, automotive, medical devices, jewellery, you have a much larger group of industries that's covered that can apply greater pressure and that really also started in the 2012-2013 timeframe, because people realized they're going to need that information, country of origin information to help meet their disclosure obligations under Dodd Frank. ”

Enhanced communication

The second most frequently identified practice in the category of *Collaboration* is the practice of *Enhanced communication*. All six interviewees identified communication between member firms and between member firms and smelters and refiners as important to achieving smelter and refiner participation in the CFSP. *Enhanced communication* was identified as the SETs, their

mass outreach tactics, networking efforts, and the sharing of information between agents in the supply chain. The interviewees identified emails, phone calls, messaging apps (such as WhatsApp), letters, and in-person site visits as essential communication tactics that enabled the CFSP to be successful in achieving smelter and refiner participation. However, these tactics do vary across industry and geographic regions.

Interviewee 1 identified that communication so deeply in a supply chain and across so many actors can be challenging, leading to a loss in the ability to have nuanced discussions, and that the message needs to be specific. Interviewee 6 explained that the mass outreach form of communication was not always successful, but there were efforts by the SETs to manage smelter engagement from the beginning of the engagement process to when the smelter or refiner achieves compliance in the form of the SPOCs. Interviewee 1 added that to address this, the SETs have been helpful in that they designate SPOCs, but sometimes wires were crossed. Interviewee 2 echoed the value of the SETs, stating that at first it was the U.S. team reaching out, however the development of the SETs and the SET sub-teams greatly increased engagement. Interviewee 6 echoed that outreach in the form of *“face to face interaction and the hand holding of getting them ready for the audit”* were successful in encouraging smelter and refiner participation in the CFSP. Interviewee 3 further elaborated on the importance of the outreach tactics and the role the SETs played in overcoming communication barriers and achieving smelter and refiner active statuses especially through site visits and direct face-to-face contact with the smelters:

“The reason behind [site visits] was we did see a lot of communication barriers, language barriers, in the letters and emails we sent. Examples, some smelters did not understand the language that we were communicating, mostly English. Some were not too tech savvy, which prevented them from getting into the system, understanding the

CFSI system. So what we did was, as member companies... we requested the smelters for personal visits to their locations. Going there, helping them, making them understand the legal requirements also explaining to them why we are driving the program of conflict free, what happens in certain areas, that is what played a major role. I think the SET team played a major role”.

Interviewee 4 identified that enhanced communication and levels of trust were needed between the agents in the supply chain in order to address concerns with “*business confidential information [and] lack of awareness*” as “*there was business confidential information that downstream customers should not see*”. Interviewee 5 reiterated the importance of building trust, stating that the first step in outreach is building a level of trust in order to have fruitful discussion. Interviewee 5 also spoke to the importance of networking, and strategically leveraging communication channels with existing partners, stating that in the gold supply chain, everyone knows each other, and it is key to get to know everyone in the network. Interviewee 5 identified that a key communication tactic was meeting with key decision makers (such as CEOs), to ensure a meeting is successful. They further explained that there were, of course, several experiences where a discussion call was not successful, but it was not by reason of the communication tactic employed, but rather the SORs’ conviction that the OEMs conducting the outreach were not part of their downstream customer chain.

4.3.3 Continuity

The category of *Continuity* was the third largest category based on number of references. Within this category, the most frequently mentioned practices were *SC partner development* (77) and *SC visibility* (63). Due to their infrequency, *SC partner selection* and *Long-term relationships* will not be discussed in detail.

SC partner development

SC partner development was the most identified practice in the category of *Continuity*. *SC partner development* was coded to references made to convincing identified suppliers to participate in the CFSP.

In order to overcome the challenge of communicating deeply in a supply chain, and across multiple actors, Interviewee 1 identified the need to have specific messaging and requests. Interviewee 6 agreed, adding that after conducting a supplier survey every year to identify smelters in the supply chain, the suppliers are asked by the CFSI, “...*to engage with their supply chain so that they can convince people to join the program...and try to sit down with them to talk...because that way they understand that we want them to be successful*”. Interviewee 1 continued, adding that in the gold industry, there is a challenge with banks (who are and the primary direct customers of gold refiners) not exerting pressure onto suppliers. Thus it is important to communicate with SORs and, as Interviewee 1 summarizes, to share why an SOR is important to them and relevant. Interviewee 5 agreed with this, stating that when smelters and refiners do not believe that OEMs are customers, it is key to explain that while they are not direct customers, the OEMs are still in the supply chain. Interviewee 3 continued, stating that most SORs “*are not aware of what the CFSI is, [and] some of them in developing countries are not so familiar with the code of responsible sourcing*” and that when SETs visit SORs, help them, explain the legal requirements and “*why [the CFSI is] driving the program of conflict free, what happens in certain areas, that is what played a major role [in achieving active status].*”

The importance of *SC partner development* was also identified by Interviewee 1, who stated that the tin smelters and suppliers who held-out after 2014 on participating the CFSP, were finally convinced to participate. When trying to convince suppliers to participate in the CFSP, Interviewees 1, 5, and 6 spoke to importance of the SETs assigning a single point of contact (SPOC) to each identified supplier, in order to develop them into an active, and then compliant participant. Interviewee 1 stated that the SET has been helpful in that they designate SPOCs in order to communicate deeply in the supply chain and make suppliers understand that it was real request and to make them feel less hesitant about the audit by explaining the audit and helping them understand the audit. Thus, through *SC partner development*, capacity building happened at the same time as contact.

Another *SC partner development* tactic used by the SETs and SPOC is the Initial Audit Fund, which CFSI member firms contribute to in order to subsidize the cost of a supplier's first audit with the CFSP. Interviewee 6 spoke to the effectiveness of this fund, stating that in the tin industry the initial peaks of participation are due to the Initial Audit Fund, which incentivized SORs to join the program, adding, however, when SORs are required to pay for their subsequent audits, retention of SORs in the program becomes a concern. Interviewee 4 also spoke to the effectiveness of the Initial Audit Fund in the gold and tungsten industries, and added that if an SOR passes their first two audits and does not source from a covered country, they are only required to get an audit once every three years. This incentivized SORs who do not source from the region to cut their costs by one-third, resulting in the "*cost to global market access [being] much lower and make[ing] good business sense*".

SC visibility:

The practice of *SC visibility* is not found in the original framework, and thus, was not deductively coded. Rather, references to SC visibility were identified in the qualitative data through the inductive content analysis process. The interviewees described two aspects of SC visibility: first, OEMs establishing visibility to smelters upstream in their supply chains, and second, upstream smelters and refiners identifying OEMs as downstream customers.

The interviewees identified many challenges OEMs face when trying to determine smelters and refiners upstream in their supply chains. Interviewee 1 identified it can be hard for OEMs to identify SORs and confirm if they are operational, since there are lots of “mom and pop” producers who lack significant presence. Interviewee 1 explained that it could require a lot of fact checking, such as looking at conference lists, or asking other refiners if they knew a particular small smelter to confirm identity. Interviewee 2 stated that visibility (or lack thereof) was a large factor that could prevent smelters from being engaged. Interviewee 5 stated that research, done by member firms, played a role in understanding the definition of a typical smelter or refiner and then submitting information and proof (through the Supplier Identification Survey) to the Supplier Disposition Team to determine the smelter’s eligibility. Interviewee 6 also emphasized the importance of the survey in overcoming the challenge of “*twisting through the supply chain*” to identify upstream suppliers. Interviewee 4 explained that increasing transparency in the mineral supply chain was a priority when creating the CFSI and furthermore “*that the smelters were the pinch point in the supply chain and that we could actually have good visibility, fairly good visibility down to the smelters, so that was kind of the focus and validated the concept of the Conflict-Free Smelter Program*”. Interviewee 4 noted that the SGE decreased

transparency in the gold supply chain. Lastly, when upstream smelters and refiners try to determine their downstream OEMs in their supply chains, Interviewee 1 identified that the SETs had to make SORs understand that the SET requests were real and that the member OEMs were, in fact, a downstream customer before the smelter or refiner committed to participate in the CFSP.

4.3.4 Government Interventions

The category of *Government interventions* was the fourth largest category based on number of references. The most frequently identified practice was *Direct regulation* (64). *Interactive regulation* (13) was the second most identified practice. *Government as active consumer*, and *Facilitating self-regulation* had few references within this category and will not be further discussed.

Direct regulation

All six interviewees identified *Direct regulation* in their responses. *Direct regulation* was referenced as, both, being a factor that drove smelter and refiner participation in the CFSP, and a factor impeding participation. Interviewees 1, 2, 3, 4, 5 all identified the U.S. 2010 Dodd-Frank Act as a primary driving factor that enabled or promoted smelter and refiner participation in the CFSP. Interviewee 5 identified legislation, participation in the Dow Jones Index, and the reporting needs of the Securities and Exchange Commission (SEC) as forces driving SOR participation in the CFSP. Interviewee 3 emphasized “*most of the push ...for the smelter to get into the CFSP program came when the Dodd Frank came into place*”. Interviewee 4 elaborated that the Dodd-Frank helped foster multi-industry collaboration and also spoke to the influence of

international initiatives (such as the Dodd-Frank Act, the OECD Due Diligence Guidance and the SEC reporting requirements) in identifying and targeting smelters and refiners as the pinch point in the mineral supply chain.

When speaking to *Direct regulation* being a barrier that prevented smelters and refiners from participating in the CFSP, national regulations were identified by multiple interviewees. Interviewee 2 stated that the presence or absence of local regulations impeded smelters from participating. Interviewee 3 and Interviewee 6 explained that meeting licencing and tax requirements took priority over participation in the CFSP, as these local legislations created financial barriers and barriers to export that created reluctance to participate in the CFSP. Interviewee 4 echoed that the presence of ineffective local legislation resulted in illegal gold being worth more than legal gold and, thus, created a barrier impeding gold smelters and refiners from participating in the CFSP. Interviewee 1 identified that the lack of consistent international regulation impeded the participation of foreign smelters and refiners from participating in the CFSP. Interviewee 1 further elaborated that since the Dodd-Frank Act is a U.S. law, and European law was based in the European Union, there was difficulty in convincing Chinese smelters and refiners to be a part of the program.

Interactive regulation

Interactive regulation was coded to references to governments cooperating with the CFSP. Four interviewees identified the practice of *Interactive regulation* as both a factor that enabled and impeded smelter and refiner participation in the CFSP. Interviewee 1 identified the need to collaborate with government, involve embassies, and work with an aggregator or semi-regulatory

body in order to successfully drive participation in the CFSP. Interviewee 2 also spoke to working closely with government bodies that managed 3TG metals. Interviewee 4 spoke to the CFSI being “*actively engaged in development of the OECD Due Diligence Guidance*”. Interviewee 6 also added that active collaboration and engagement between the CFSI and the ICDX (Indonesia Trade Derivatives Exchange) enabled successful participation in the CFSP.

4.3.5 Pro-activity Management

The category of *Pro-activity Management* contained was the second smallest category based on number of references. Within this category, *Learning* (21) and *Sustainable pro-activity* (18), and *Innovation* (12) were the most frequently referred to practices, and are described in further detail below. *Linkage development* and *Stakeholder management* had the fewest references within this category, and due to their infrequency will not be further explored.

Learning

The most frequent practice in the category of *Pro-activity management* was *Learning*. Interviewee 5 identified that there was “*no guidebook*”, and there were some difficulties in developing effective SET deep supplier engagement strategies. Interview 1 also spoke to the lessons learned in developing the program and, after learning, of areas of improvement to develop new strategies, such as the Smelter Disposition Team to address inefficiencies. Interviewee 2 elaborated that learning led to the development of local SET teams, as the initial US and Canadian teams did not have the capacity to do outreach to the degree of success as the local SET teams are doing now. Interviewee 1 also identified that the CFSI strategically created audits that included room for continuous improvement for the smelters and refiners. Interviewee

4 spoke to working closely with industry associations, smelters and refiners, audit firms, and OEMs in order to develop the CFSI. Interviewee 4 also spoke to the phenomenon of non-industry members learning of the CFSI and from the CFSP and, in turn, contributing to improvements in the program:

“And you start to get a level of trust, not that everybody agreed, but I think civil society, the Global Witnesses, out there, realized that industry was making process, were trying to solve this, and it wasn't going to happen overnight, but at least them having the opportunity to see what was being done, how it was being done and then to critique it and to provide some input, help develop the relationships.”

Sustainable pro-activity

The practice of *Sustainable pro-activity* is not found in the Sauer and Seuring's (2017) minerals supply chain management framework, which includes *Environmental pro-activity* within the category of *Pro-activity management*. However, the qualitative data does not make any reference to environmental initiatives, but rather, to the social sustainability outreach, responsibility, and initiatives put forward by the OEMs, in efforts to pro-actively manage their mineral supply chains. Interviewee 1 spoke to the action-oriented nature of the SET being a model in corporate sustainability, and to the importance of the SET being goal and action oriented, led by a group of leader OEMs who believed there should be a working goal. Interviewee 4 echoed the statement that the CFSI is a model of *Pro-activity management* and also spoke to the action oriented goals that led to the creation of CFSI and its evolution into *“a model, that's been starting to be used across a number of different fronts, whether it's forced labour, child labour, other commodities, as kind of a benchmark”*.

Innovation

Interviewees 1 and 5 speak to innovation in the context of developing the CFSI as a new and novel business model, and of writing their own guidebook. Interviewee 4 continues, adding that innovation is a process, where the rate of innovation changes as the CFSI matures:

“...And so, we were able to get far enough along and start getting things in and were able to set the model and the template. And now it's kind of caught up and change is now much slower and the thing moving forward is much slower. But that's not necessarily by design, it's just because it happens as things mature. And then they should - hopefully you're getting it right so therefore you don't need a lot of change. But that was one of the reasons we were able to make good progress in such a short period of time.”

4.3.6 Orientation

The category of *Orientation* contained the fewest occurrences among codes. Within this category, the interviewees only identified the practice of *Dedication to SCM* (31). The practice of *Dedication to TBL* was not found in the interviewees' responses.

Dedication to SCM

Dedication to SCM was identified by five of the six interviewees. There were two concepts within *Dedication to SCM* – the CFSI and member OEMs' SCM orientation and the smelter and refiners' orientation to SCM.

When speaking to smelter or refiners' commitment to SCM, Interviewee 1 identified that smelters or refiners that did not participate in the CFSP were those who did not understand it or who had different priorities. The OEMs and CFSI's *Dedication to SCM* was identified by Interviewee 1, who stated that initially all the OEMs tried to do SCM themselves when describing the origins of the CFSI. Interviewee 3 echoed this stating that *“there were some other*

companies which were doing it voluntarily... as a part of their corporate social responsibility...”. Interviewee 5 also acknowledged that it was a new phenomenon that companies were becoming more responsible for the entire supply chain.

When describing SOR orientation to SCM, Interviewee 3 explained that SOR unfamiliarity with SCM was a barrier preventing participation, as “*some of them in developing countries are not so familiar with the code of responsible sourcing*”. However, Interviewee 3 described a change in smelter and refiner orientation driving towards a *Dedication to SCM*, as now “*refiners are becoming more knowledgeable when it comes to conflict free*”. Interviewee 6 spoke to the success of the outreach efforts, including a stage where the SET needs to convince the smelter or refiner to adopt SCM and “*do the right thing basically*”.

4.3.7 Contextual Dimensions

The category of *Contextual dimensions* was not a part of Sauer and Seuring’s 2017 framework of sustainable mineral supply chain management. This category, and the two practices within it – *Liability of foreignness* and *Unique industry considerations* – were identified through the inductive content analysis process. They are described in further detail below.

Unique industry considerations

The practice of *Unique industry considerations* was the most identified practice, within the category of *Contextual dimensions*. *Unique industry considerations* was coded to interviewees’ responses that referenced that each 3TG metal industry was different, and the CFSI and SETs’ need to overcome different barriers in each metal’s industry in order to successfully engage with

suppliers deep within the supply chain and achieve smelter and refiner active status in the CFSP. As each interviewee was asked to speak to their area of expertise, the majority of the codes reference excerpts such as “specific metals” or “specific industries or sectors”.

All the interviewees, however, mention gold and the gold industry as being especially unique and different from the 3T metals. Interviewee 5 described the gold sector as the most “*risky sector*”, and the closest to those doing “*risky business*”. Interviewee 1 stated that gold was the most challenging and the hardest, the industry where the SET tactics have been least successful, and that required different tactics than other metals. Interviewee 1 explained that this was due to the numerous uses for gold, such as currency and jewellery, the high value of small amounts of gold, extensive trading, and, along with Interviewee 3, addressed the secretive and competitive nature of the gold industry. Interviewee 4 also spoke to gold being unique from the 3T metals, stating that gold usually has a “*long tail of refiners to it just because of the ease of refining and the value of gold*” and there are “*a lot more players in [the gold] space*”. Furthermore, gold is a “*high value commodity at a very low volume, whereas the other ones much lower value with higher volume. And gold is very different even on the ground in the Congo*” (Interviewee 4). Interviewee 6 reiterated that the uniqueness of the gold industry and it being a “harder metal to tackle” is due to a number of reasons: the ease of having a gold refinery anywhere; high rates and relative ease of recycling gold, difficulties tracking gold due to small quantities having large profits; the electronics industry’s lack of leveraging power in the gold space; gold being a big part of the jewellery industry; and that people aren’t always aware of the issues surrounding the gold industry.

Liability of foreignness

The practice of *Liability of foreignness* was the second inductively identified practice in the *Contextual dimensions* category. *Liability of foreignness* was coded to interviewees' responses that referenced the CFSI and SETs' need to acknowledge and overcome barriers such as language, culture, foreign business practices, and geographic distance, in order to successfully engage with suppliers deep within their supply chains and achieve smelter and refiner active status in the CFSP.

Interviewee 1 referenced *Liability of foreignness*, explaining that SET outreach tactics depends on the region or that there were language-gaps that required translators to overcome. Additionally, Interviewee 1 spoke to foreign business practices, mentioning, for example, that in Indonesia, no one does business by email. Interviewee 2 listed a number of challenges that face the SETs in specific regions: language, time zones, and cultural barriers. Interviewee 5 also spoke to these challenges, stating that it was important to be part of the local culture and to speak the language of the local country, and further added that in order to reach the key contact, colleagues that spoke the correct language had to be leveraged. Interviewee 4 identified that the location of a smelter or refiner played a role in the pressure supply chain agents were able to exert onto the supplier. Interviewee 2 also stated that initial outreach efforts involved the U.S. team reaching out to smelters and refiners at first, but the development of the SET, and then the sub-teams, greatly increased engagement. Interviewee 3 echoed this statement: "*Creating local SET teams also helped, because only the US and Canada initially, could not do the outreach that the local SET team is doing now*". Interviewee 3 identified that *Liability of foreignness* was a key motivator driving the types of deep supplier engagement tactics the SETs employed in order

to be successful in “*Breaching language [and] breaching communication*” barriers that impede SOR participation in the CFSP. Interviewee 6 also spoke to the types of deep supplier engagement tactics needing to be culturally specific:

“The thing we experienced in Indonesia is that smelters don't like to read or respond to emails. So we've recognized that its very very important, especially in Indonesia culturally to have that face to face relationship and show up to a conference, stay in touch with the smelter you got to be compliant because if we don't, we've seen smelters fall off the compliant list ...So we know that for Indonesia, we have to constantly be there. Somebody from the RMI has to be there for the conference, or for the audit and stay in touch that way and through WhatsApp which, the messaging app, everybody uses it there too... Phone calls- they work if you have, if you can find a phone number, because most smelters in Indonesia don't even have a website and then there's the language barrier because not everybody speaks English. Fortunately we do have a few RMI members who speak Bahasa Indonesia, which is the local language, and we have been successful that way. But if I tried to call and talk to them in English, they're not comfortable, even if they speak English, they're not comfortable speaking on the phone or they're embarrassed or whatever so they just don't want to talk to you over the phone.”

In regards to a specific region being more difficult to successfully, engage with, Interviewee 1 identified geographic China as a problem. Interviewee 6 reiterated, stating that China “*is one of the hardest regions*” for reasons including the Chinese Shanghai Gold and the uniquely complex nature of the gold industry. Interviewee 4 reinforced this, adding that the SGE played a role in decreasing upstream supply chain visibility:

“Within China, the Shanghai Gold Exchange, the gold would go in and go out, there was no tracking of who got what gold... so if you tried to chase the gold supply chain, it was always stopped at the exchange, and so you really didn't know who your refiners were, so you couldn't necessarily put pressure on them. And then also, gold, it has such a long tail of refiners to it just because of the ease of refining and the value of gold. You have a lot more players in that space.

Chapter 5: Discussion

5.1 Discussion

The purpose of this thesis was to identify the tactics that allow the CFSI and SETs to engage deeply in their supply chains, beyond the visible horizon. The research questions were: What are the mechanisms of deep supply chain engagement used by CFSI member OEMs to connect with upstream producers? How effective are they? How do OEMs work together to engage suppliers?

This thesis successfully researched deep supplier engagement and determined the mechanisms of deep supply chain engagement used by CFSI member OEMs to connect with upstream producers. Downstream OEMs work together to engage suppliers deeply in their supply chains, beyond the visible horizon, though employing tactics of deep supplier engagement, which were successfully identified in the qualitative analysis and reinforced by the timeline analysis. These tactics are summarized in Section 5.4.

This research also empirically tested Sauer and Seuring's (2017) framework of sustainable mineral supply chain management, through a convergent parallel mixed methods approach (presented in Section 5.2). The results of the deductive content analysis validate the majority of the practices and categories identified by Sauer and Seuring's (2017) framework. The analysis provided significant evidence reinforcing understanding of sustainable mineral supply chain management practices in the categories of *Pressure groups*, *Joint development*, *Enhanced communication*, *Direct regulation*, and *Dedication to SCM*. However, none of the interviewees

referenced the practices of *Selective monitoring* and *Dedication to TBL* in the qualitative results. Additionally, there are elements of the framework, identified through the inductive content analysis that this research has extended. This extended framework is presented in Section 5.3.

Beyond Sauer and Seuring's (2017) model, the results also significantly support the findings of previous studies, notably Carter et al. (2012), Young (2015), and Young and Dias (2012). Carter et al. (2015) identified agents as actors in a supply chain that look upstream (towards suppliers) and downstream (towards buyers), and describes the limit to which an agent is aware of the supply chain as the "visible horizon" (p. 93). The distance of this visible horizon is based on factors such as cultural distance, physical distance, and closeness centrality (Carter et al., 2015). *SC visibility* is an important factor impacting SSCM; other factors include organizational and supply chain complexity (Kim and Davis, 2016). The qualitative results established that in mineral supply chains, the barriers impeding *SC visibility* include cultural and physical distance, closeness centrality, and multi-tiered supply chain complexity. This research also determined that in order to overcome these barriers and successfully extend their visible horizons, members of the CFSI and SETs (i.e. agents) employ deep supplier engagement tactics. Responsible and conflict-free sourcing illustrates the need of compliance and SSCM management strategies to span multiple tiers of a supply chain in order to address social issues in developing countries (Young, 2015). Young (2015) and Young and Dias (2012) discuss the use of smelters and refiners as chokepoints as an effective tool by which downstream OEMs identify and engage with upstream suppliers and manage their supply chains. Smelters and refiners were established to be the pinch point as at this processing stage in the supply chain, the number of actors narrow significantly (Young and Dias, 2012). The CFSI targets SORs "as "gates" where the supply of

metal shipments can be controlled and audited” (Young and Dias, 2012, p. 2). Through analysing the qualitative results, this thesis validated targeting deep supplier engagement tactics to SORs as an effective and efficient approach to manage social issues in upstream suppliers, especially in the 3T spaces. This research also answered the research question “How do OEMs work together to engage suppliers?”. Collaboration and participation in meaningful relationships with different agents (Carter et al., 2015) builds a firm’s capacity to engage in ethical sourcing and address social issues within the supply chain (Roberts, 2003). Young (2015) also spoke to collaboration between CFSI member firms coordinating pooled financial resources, expertise, and SSCM strategies in order to manage shared supply networks. This thesis provides evidence supporting the success of this collaborative approach, as the interviewees refer to the CFSI as building capacity in SORs, as well as in the CFSI achieving a greater level of success when compared to independent efforts of individual OEMs.

One gap in the current SSCM literature, identified by this thesis, is *Liability of Foreignness* as a barrier in SSCM and *Regional Specific Tactics* as a means to overcome this barrier (further discussed in Sections 5.3 and 5.4). The impact of cultural and geographic distance is not widely discussed in SSCM, business collaboration, and institutional theory, yet the qualitative results largely supported the conclusion that a one-size-fits-all approach to SSCM may not be as efficient or effective when compared to the CFSI’s nuanced approach to deep supplier engagement.

5.2 Contributions to Scholarship: Methodology

The current work has employed a methodology unique to sustainable supply chain research. Unlike many studies, a case study method was not employed. Rather the research design constructed timelines, based on data from the CFSI industry association, which analysed 323 smelters and refiners, and which then guided semi-structured interviews in a convergent parallel mixed methods approach. This research design was well received by the interviewees, as the depth of analysis done before the interviews effectively facilitated qualitative data collection by allowing interviewees to successfully contextualize the timeline analysis and identify patterns of correlation. Furthermore, this convergent parallel mixed methods approach is unique in sustainable supply chain management literature. For example: Na (2016) statistically analysed timelines describing 3TG SORs; Sauer and Seuring (2017) conducted a structured content-analysis based literature review; Kim and Davis (2016) conducted a cross-sectional analysis; Carter et al. (2015) adopted a conceptual theory building approach; and Young (2015) employed qualitative methods. The methodology employed by this thesis included a timeline analysis, qualitative methods of data collection, and deductive and inductive content analyses, all of which we conducted through the lens of a sustainable mineral supply chain management framework. Limitations of this approach are discussed in Section 5.5.

5.3 Contributions to Scholarship: Extending the Framework

The results of the inductive content analysis offered the opportunity to extend Sauer and Seuring's (2017) framework. This study has added the category: *Contextual dimensions* of

Liability of foreignness and *Unique industry considerations*, as well as the practices of *SC visibility* and *Sustainable pro-activity* (Figure 9).

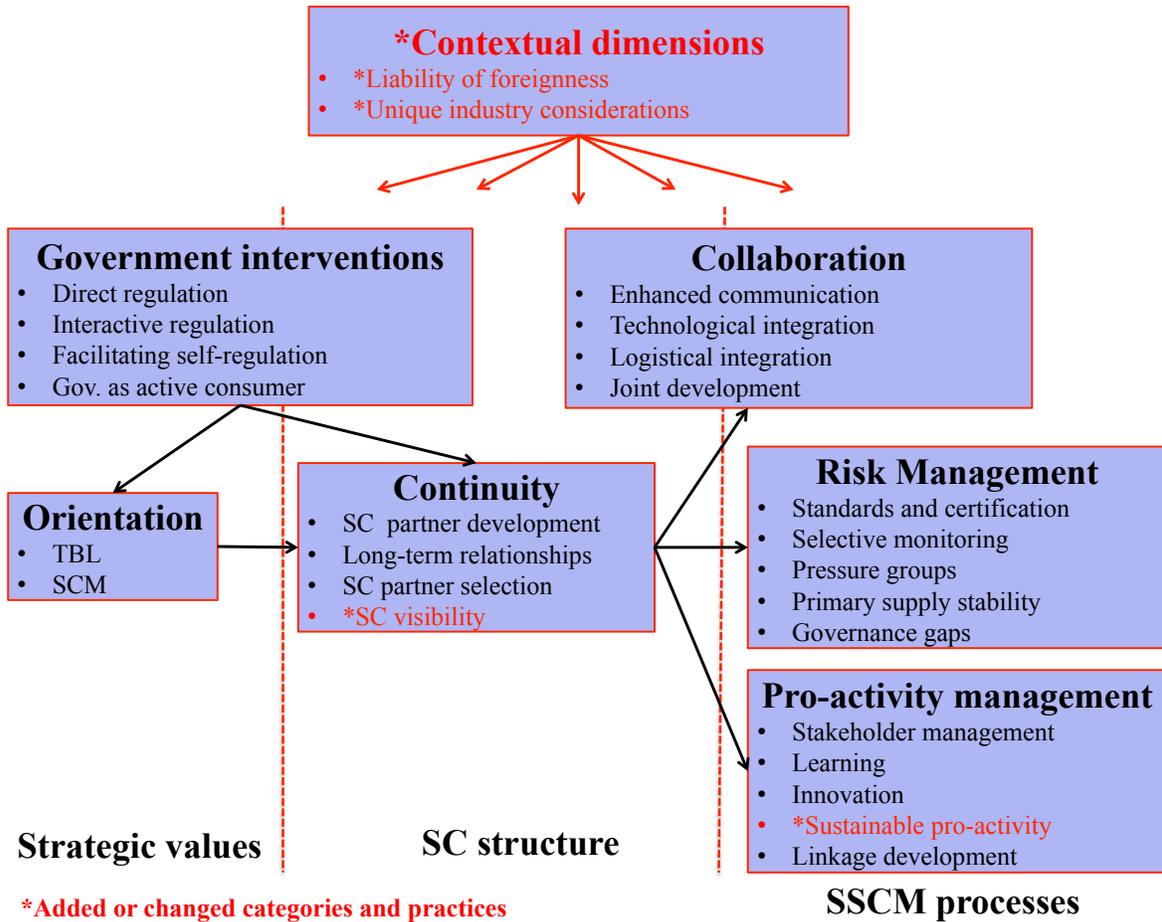


Figure 9 Refined sustainable supply chain management of minerals framework (current analysis, extending Sauer and Seuring, 2017)

5.3.1 SC visibility

The practice of *SC visibility* focused on the supply chain transparency that allowed OEMs to identify smelters and refiners in their supply chain, as well as the ability for upstream smelters and refiners to identify OEMs as downstream customers. Young (2015) describes these processes as tracing and tracking, respectively. Increasing *SC visibility* extends the visible

horizon – the depth to which tracing and tracking can occur. *SC visibility* is outside the scope of this research, which focuses on engagement that occurs after an SOR is identified. Nevertheless, it is a unique challenge facing mineral supply chains as evident through the qualitative results, and further investigation of *SC visibility* is identified as a direction of future research (Section 6.2). The decision to house this practice under the category of *Continuity* derives from Sauer and Seuring’s comments about “Continuity draw[ing] on the SC structure and focus[ing] on building long-term relationships with selected SC partners” (Sauer and Seuring, 2017, p. 238).

5.3.2 Liability of Foreignness

Liability of foreignness is defined as the additional costs multi-national enterprises face when doing business abroad due to factors such as unfamiliar environments, cultural, political and economic differences, and geographic distance (Zaheer, 1995). All six interviewees identified one or more of these factors when describing the challenges the SETs faced when conducting deep supplier engagement. Downstream OEMs were able to overcome these challenges through *Regionally Specific Tactics* (Table 4), which include collaboration (with influential agents like industry associations or governments closer to the SOR in question), strategic structure (the creation of regional specific SETs), and economic investment (e.g. costs of travel, translations, and the Initial Audit Fund), and thus effectively translate the costs of *Liability of foreignness* into participation of SORs in the CFSP.

The current research proposes the practice of *Liability of foreignness* as a *Contextual dimension*. The category of *Contextual dimensions* forms the foundation of and guides the *Strategic values*,

SC structure, and *SSCM processes* that compose Sauer and Seuring's (2017) framework as well as the deep supplier engagement tactics of the CFSI.

5.3.3 Unique Industry Considerations

Another consideration added to the framework is *Unique industry considerations*. The selection and success of deep supplier engagement tactics (such as mass outreach, leveraging industry associations, regulatory pressures, and market pressures) differed between the four 3TG industries. Despite their similarities (e.g. SORs as a chokepoint) the interviewees described industry specific nuances. Additionally, the nature of the gold and the gold industry being unique and different to tin, tantalum, and tungsten is evident through not only the analysis of the qualitative results, but also in creation of the Gold SET as the only mineral specific SET – the others were designed to be regionally specific. Thus, it is clear that there is no one-size-fits-all approach to sustainable supply chain management or to sustainable mineral supply chain management. This conclusion leads the research to propose the addition of *Unique industry considerations* to the *Contextual dimensions* category, as the characteristics of each industry ground the *Strategic values*, *SC structure*, and *SSCM processes* and guide the application and success of deep supplier engagement tactics.

5.3.4 Conflict Minerals as a Sustainability Issue

The last addition to the framework is the practice of *Sustainable pro-activity*. Sauer and Seuring (2017) identify the practice of *Environmental pro-activity*, housed under *Pro-activity management*, and define it as “Environmental pro-activity represents a further means to diversify from competitors and gain competitive advantages in mineral SCs” (p. 238). However, none of

the interviewees alluded to *Environmental pro-activity* or *Dedication to TBL*. Rather, they spoke to the importance of social sustainability outreach, responsibility, and initiatives put forward by the OEMs, in efforts to pro-actively manage their mineral supply chains. This is not surprising as the interviewees were SET members; they focused on responsible sourcing and the conflict minerals problem, rather than the overall sustainability efforts of their respective firms. This disagrees with literature that emphasizes that sustainable supply chain management incorporates the three pillars of sustainability – social, economic, and environmental (Seuring and Muller, 2008; Ahi and Searcy, 2013). The present research proposes the modification of *Environmental pro-activity* to *Sustainability pro-activity* in an effort to include the social sustainability driven focus, responsibility, and initiatives characteristic of sustainable mineral supply chain management under the umbrella of sustainable development.

It is of further interest to discuss the success of social sustainability initiatives and the relatively lesser success of environmental corporate social responsibility initiatives. Based on the current literature and the qualitative results, this thesis summarizes five factors that could contribute to the successful management of social sustainability issues when compared to environmental sustainability issues:

1. When compared to environmental issues, social issues are harder to identify and manage (Esmail, 2017).
2. Awareness of the severity and visibility of the exploitation of people and abuse of human rights through forced labour, sexual violence, and armed conflict in the extraction and

manufacturing of conflict minerals is not only significant and worth investigating, but could normatively pressure agents in the supply chain to take action.

3. The nature of the mineral supply chain presents smelters and refiners as clear chokepoints, at which downstream OEMs can effectively identify and engage with upstream suppliers (Young, 2015).
4. The presence and enforcement of regulatory requirements demanding socially sustainable conflict-free sourcing, such as the Dodd-Frank Act and the OECD Due Diligence Guidelines.
5. Within the electronics industry and the CFSI there are a number of champions, with strategic influence and resources, who support sustainable supply chain management. Interviewees identified particular individuals and firms (kept anonymous for confidentiality) who championed the development of the CFSI and its outreach efforts and whose leadership was described as essential to achieving success.

5.4 Contributions to Industry Practice

This thesis contributes to industry practice through the identification of deep supplier engagement tactics and the evaluation of their effectiveness in SSCM. Table 4 presents a summary of the key engagement tactics identified by the results.

Table 4 Summary of Deep Engagement Tactics as Identified by Interviewees

Type of Engagement	Engagement Tactic & Application
Education	<ul style="list-style-type: none"> • SETs held CFSI sessions at industry conferences • CFSI created Smelter Disposition Team to determine SOR eligibility • Downstream OEMs conducted Supplier Identification Survey/ Conflict Minerals Reporting Template to determine SORs in their supply chains • SETs conducted research to identify and determine SORs and key gatekeepers • CFSI held workshops (to engage with governments, civil society members, NGOs)
Collaboration	<ul style="list-style-type: none"> • CFSI/SETs collaborated with supply chain agents such as industry members, industry associations, civil society members, and governments • CFSI/SETs collaborated with upstream industry associations
Incentives	<ul style="list-style-type: none"> • SETs leveraged market access • CFSI created and funded the Initial Audit Fund; SETs leveraged this financial incentive
Metal Specific Engagement	<ul style="list-style-type: none"> • CFSI collaborated with industry associations and cross-recognized compliance
Legislation	<ul style="list-style-type: none"> • SETs leveraged regulatory pressures and SEC reporting requirements
Mass Outreach	<ul style="list-style-type: none"> • SETs communicated with SORs via emails/phone calls/letters/WhatsApp
Networking	<ul style="list-style-type: none"> • SETs leveraged key industry/SOR contacts • SETs attended industry conferences
Regionally Specific Engagement	<ul style="list-style-type: none"> • CFSI created regionally specific SETs • SETs worked with translators • SETs/ SPOCs conducted site visits of SORs • CFSI collaborated with local governments
Targeted Outreach	<ul style="list-style-type: none"> • CFSP identified SORs as choke points in supply chains for targeted engagement • SETs/ SPOCs conducted site visits of SORs • CFSI/SETs created Single Point of Contact (SPOC) • CFSP conducted mock audits

The deep engagement tactics described in Table 4, correlate with many of the peaks of SOR participation identified in the timeline analysis. Institutional and stakeholder theory suggest that normative and coercive pressures exerted by influential stakeholders can drive supplier organizations towards socially responsible practices, when regulatory pressures, economic support, industry champions (Sarkis and Zhu, 2007), and multi-sector market pressures

(Fitzpatrick et al., 2014) are present. This is evident in the development of the CFSI/SETs and the success of their specific and novel deep supplier engagement tactics. The deep supplier engagement tactics of *Targeted Outreach*, *Incentives*, *Regionally Specific Engagement*, and *Mass Outreach* stand out as being interesting as well as novel to the CFSI and mineral supply chains.

Targeted Outreach is particularly interesting, as the identification and targeting of a specific pinch point of the supply chain (the SOR stage) is unique, as downstream firms skipped over their first and second tiers in order to maximize the effectiveness and efficiency of their engagement. Furthermore, it is interesting, and not often practiced in traditional SCM, that OEMs have adapted their business model to fit the needs and convenience of their suppliers. The volunteering of OEMs' time and financial resources to dedicate a SPOC and to conduct individual site visits are interesting since, due to the low visibility of the supply network, SPOCs may conduct site visits to SORs that do not supply their OEM. One explanation for these unique SSCM mechanisms could be that, due to the criticality of the 3TG metals, this adaptive and resource intensive approach was necessary. Other critical commodities that may require *Targeted Outreach* include oil and gas and cobalt, which suffer from major environmental and social sustainability issues.

Another successful and interesting tactic is *Incentives*, and particularly the Initial Audit Fund. Leveraging market access as a means to achieve compliance to standards is seen in other compliance initiatives (e.g. Fair Trade, Forestry Stewardship Council, which label to show compliance). However, perhaps due to limited 3TG suppliers and the CFSI's commitment to avoid embargos, the CFSI also provided SORs with financial incentives to promote participation,

in the form of the Initial Audit Fund. This tactic was successful (especially in the tin and tungsten space), in achieving participation in the CFSP and in maintaining market access for these suppliers. Incentives to achieve compliance while avoiding embargos could be a successful tactic in electronics supply chains outside the 3TG space, such as cobalt, which is beginning to be considered as a conflict mineral.

The CFSI also practiced *Regionally Specific Engagement*, through creating regional SET teams, conducting site visits, and collaborating with local governments. This tactic enabled downstream firms to overcome the inefficiencies and ineffectiveness of a one-size-fits-all approach to their global supply chain networks. The CFSI is novel in its ability to identify nuanced regional differences and successfully respond to those differences with specifically targeted engagement approaches. The effectiveness of regional specific SETs and SPOCs to manage nuance was identified by the qualitative results and reinforced by the timeline analysis that showed increased SOR participation correlating with the creation of the SETs. Other industries characterized by global multi-tiered supply chain networks, such as coffee, may benefit from a *Regional Specific Engagement* approach when managing the social and human rights concerns in their supply chains.

Lastly, *Mass Outreach* was identified as an important tactic employed by the CFSI and the SETs. This tactic of deep supplier engagement is novel for a number of reasons as *Mass Outreach* involves collaboration and coordination of numerous downstream, and often competitor, firms; relies on time and financial resources volunteered by these downstream firms; skips first and

second tiered suppliers, to directly target and exert pressure onto SORs deep in the supply chain network; and increases the visibility that SORs have in their downstream OEMs.

This investigation of the methods of deep supplier engagement contributes to industry practice, through identifying successful supplier engagement tactics that could be adapted to address social issues in other mineral or non-mineral supply chains. The effectiveness of the deep supply chain engagement tactics employed by the CFSI is influenced by the identification and targeting of a pinch point in the supply chain. The coffee supply chain, for example, “is complex as beans pass through the hands of growers, traders, processors, exporters, roaster, retailers and finally the consumer” (Fair Trade Canada, 2018). Fair Trade created cooperatives as the pinch point in their supply chain, where cooperatives (like the SORs) take responsibility for SSCM of the upstream farmers they represent. However, the CFSI’s deep supplier engagement tactics may not be as effective when applied to supply chains that do not have a pinch point, those that have human rights concerns throughout their supply network, and/or those that do not face the visibility challenges characteristic of mineral supply chains. One such industry is textiles where social issues and human rights violations occur at multiple stages of manufacturing and production (e.g. farming, dyeing, stitching). Furthermore, the joint development and collaboration of industry competitors, NGOs, governments, industry associations, and civil society members to conduct sustainable supply chain management is a unique characteristic of the CFSI and may serve as a model for successful multi-stakeholder initiatives in other industries

5.5 Limitations

The limitation of a mixed-methods research design is that qualitative research is difficult to replicate (Jick, 1979). This limitation was addressed by designing the interviews to be semi-structured so that interviews could be replicated. In regards to data collection during the interviews, limitations include sample-size, potential bias, and data recording. There are approximately 50 members in the SETs and six interviewees participated. The six interviewees were from different SET teams, were able to provide expertise in all four 3TG spaces, and had knowledge of different geographic regions. They represented OEMs in multiple industries and stages in the supply chain (e.g. OEMs and a first-tier supplier). As industry experts identified by the CFSI, the interviewees were deemed the most knowledgeable of the CFSI and SETs. As members of the CFSI and SET, there is potential that the opinions the interviewees expressed were skewed to present a positive reflection of the CFSI/SETs' efforts, however, when evaluating the validity of content analysis of the qualitative semi-structured interviews, it is important that the results are consistent with other information about the research topic (Holsti, 1969). Multiple consistencies between the timeline analysis and the qualitative interviews were identified (see Section 4.2), thus the timelines mitigated some of the limitations of the qualitative data. Furthermore, when comparing the results of the qualitative data among the different interviewees, the interviewees mostly supported each other and there were consistencies as multiple interviewees identified the same or similar themes and phenomena. Thus, the validity of the analysis is supported.

Another limitation of the qualitative research design lies in the accuracy of note taking. As not all the interviewees consented to being recorded, researcher notes taken during and after the interview may not have captured the data in whole and with complete accuracy. Furthermore, in regards to interviews that were recorded and transcribed, there may be potential of minor inaccuracies in the transcribing process due to human error and recording quality. The last limitation of the research design lies in the analysis, where researcher subjectivity and bias could have influenced the coding process and/or the visual representation of the results.

The results and conclusions presented in this thesis are limited in scope to the CFSI, the corporations the members of the CFSI and SET represents, and its business collaborations and sustainable supply chain management, as they are relevant to the mineral and electronics industries. As such, the deep supplier engagement tactics are limited in their generalizability to other business-led alliances, as well as SSCM initiatives in other industries. Further empirical testing of the revised framework, to understand its application to other mineral supply chains (e.g. jewellery, oil and gas, aluminum) and non-mineral supply chains (e.g. coffee, cotton) offer the opportunity to reinforce and further revise the framework.

5.6 Directions for Future Research

This study of conflict minerals examined deep supply chain engagement in management scholarship at the intersection of sustainable supply chain management, business collaboration, stakeholder theory, and institutional theory. This study reinforces, both, these theories underlying the development and initiatives of the CFSI, as well as their successful practical applications in

industry. The main contributions of this research to scholarship include empirical testing of an existing SSCM of minerals framework, the development of a revised sustainable mineral supply chain framework, and the use of timelines in a mixed methods approach. The main contributions to industry practice include examination of deep supplier engagement tactics and their applicability to SSCM.

This research identified a number of areas of further research that would be interesting to explore within the field of industry collaboration and SSCM. Firstly, as only a portion of the SET members participated in the semi-structured interviews and the timeline analysis was based on simple data selection, the cultural and regional barriers were reinforced by qualitative data as the topic of cultural barriers came up and are specific to the interviewees' areas of expertise. It would be of value to further investigate cultural and regional barriers outside of those discussed in this research (e.g. mining practices in Canada) in order to identify patterns or trends. The identification of *SC visibility* as an important practice in SSCM of mineral supply chains is also a research area of further interest.

It would be interesting to investigate other industries that struggle with social sustainability supply chain management, such as cobalt, coffee, forestry, and textiles. Evaluating the collaboration practices and deep supplier engagement tactics of their industry associations – such as the Forestry Stewardship Council, the Better Cotton Initiative, and Fair Trade – against those of the CFSI could allow for the development of multi-industry best management practices. The practical implications and effectiveness of determining a pinch point in the supply chain network

could be a first step in SSCM of these commodities. Additionally, it would be of value to test the modified framework in other mineral industries in order to further develop the model.

A final area of interest, which emerges from the discussions on *Sustainable pro-activity* and *Direct regulation*, is the difference between social and environmental sustainability legislation and SSCM. A proposed area of future research is evaluating the OEM's CSR initiatives and why environmental sustainability initiatives have not reached the level of commitment and success as the CFSI's social sustainability initiatives.

Chapter 6: Conclusions

This study employed a parallel convergent mixed methods approach to answer the research questions, and in doing so identified: the external forces and internal CFSI/SET engagement tactics that allow the CFSI member OEMs to engage deeply in their supply chains, beyond the visible horizon; the mechanisms of deep supply chain engagement used by downstream OEMs to connect with upstream producers and their effectiveness; and the practices through which OEMs work together in the CFSI to engage suppliers.

Through the analysis of timeline and qualitative data, sourced from the CFSI Smelter Database and semi-structured interview results respectively, this thesis presented a number of key findings. Firstly, key external forces and internal SET tactics were mapped onto timelines that show the supplier participation in the CFSP. This research speaks to the effectiveness of legislation, as creation of and compliance to the U.S. 2010 Dodd-Frank Act and the SEC reporting requirements were determined as being key factors driving the industry collaboration and deep supplier engagement, unique to the CFSI, as well as the success in achieving significant tantalum and tin supplier participation in the CFSP. The development of the SETs was the most identified internal mechanisms of deep supplier engagement. This research identified that the barriers to overcome in SSCM include *Liability of foreignness*, *Unique industry considerations*, and determining *SC visibility*. These findings provided new insights to the understanding and practical applications of SSCM, and were presented in a summary of deep supplier engagement tactics and through a revised model of sustainable mineral supply chain management. Additionally, this research identified that social responsibility and SSCM are perceived to be

separate from environmental pro-activity and triple bottom line, and are not widely discussed as part of CSR and sustainability. Potential factors contributing to the difference between environmental and social sustainability initiatives were proposed.

The extraction of conflict minerals contributes to the exploitation of people and abuse of human rights through forced labour, sexual violence, and armed conflict. By examining the effectiveness of the CFSI business collaboration to target deep supply chain sustainability and understanding the success and challenges related to the mechanisms of deep engagement undertaken by the SETs, this research raises awareness of the issue of conflict minerals and analyzes the industry's efforts to address this issue. It is reasonable to conclude that the CFSI (now known as the Responsible Minerals Initiative or the RMI) is a model of industry collaboration, despite competition, between key agents in a shared supply chain network. Through addressing the issue of conflict minerals as a sustainability initiative the CFSI furthers international sustainable development by contributing to the achievement of multiple Sustainable Development Goals (SDGs), including Goal 1 No Poverty, Goal 8 Decent Work and Economic Growth, Goal 12 Responsible Consumption and Production, Goal 16 Peace, Justice and Strong Institutions, and Goal 17 Partnerships for the Goals (UN, 2017).

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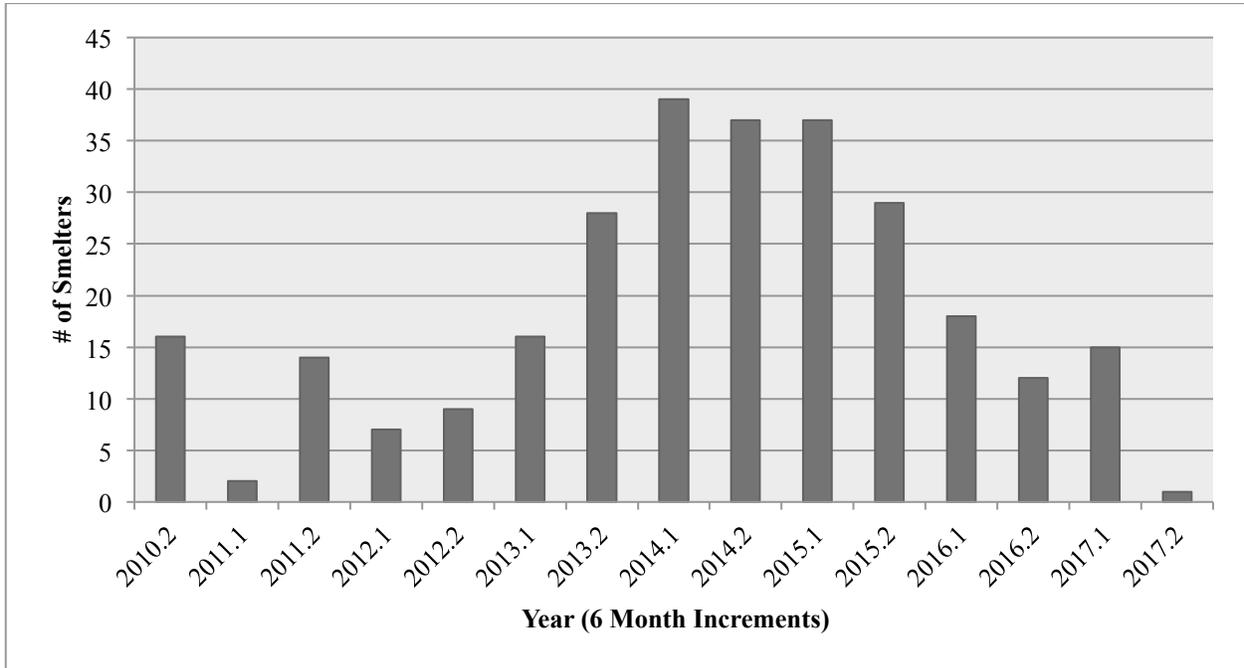
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Appendices

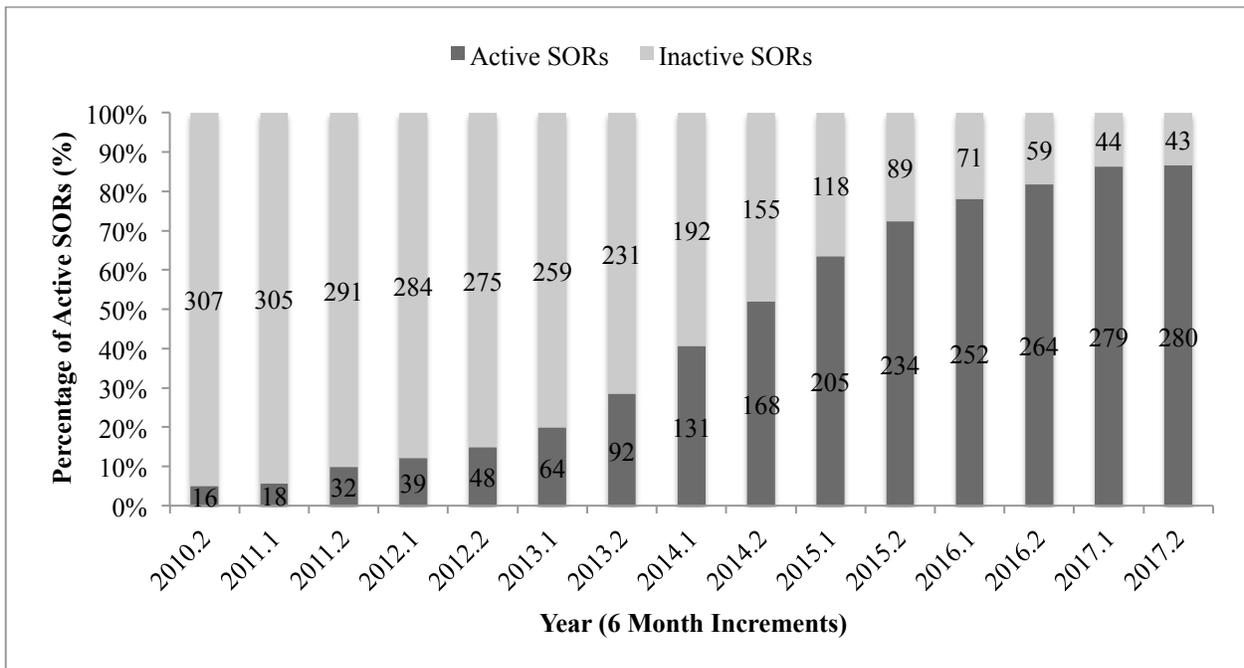
Appendix A: Semi-Structured Interview Questions

1. Can you share the story of how this metal/regional group of smelters or refiners (SORs) became active participants in the Conflict-Free Sourcing Initiative (CFSI) program?
2. What were the external factors that enabled these smelters to participate?
3. What were the external factors that impeded these smelters to participate?
4. What deep supplier engagement tactics did your SET (SET) try that worked in achieving SOR active status? Why?
5. What did you try that did not work? Why?
6. Do you have any comments or insights regarding the peaks and valleys on the graph?
7. Do you have any comments or insights that I did not address?

Appendix B: Timelines of 3TG SOR Active Dates and Participation in the CFSP



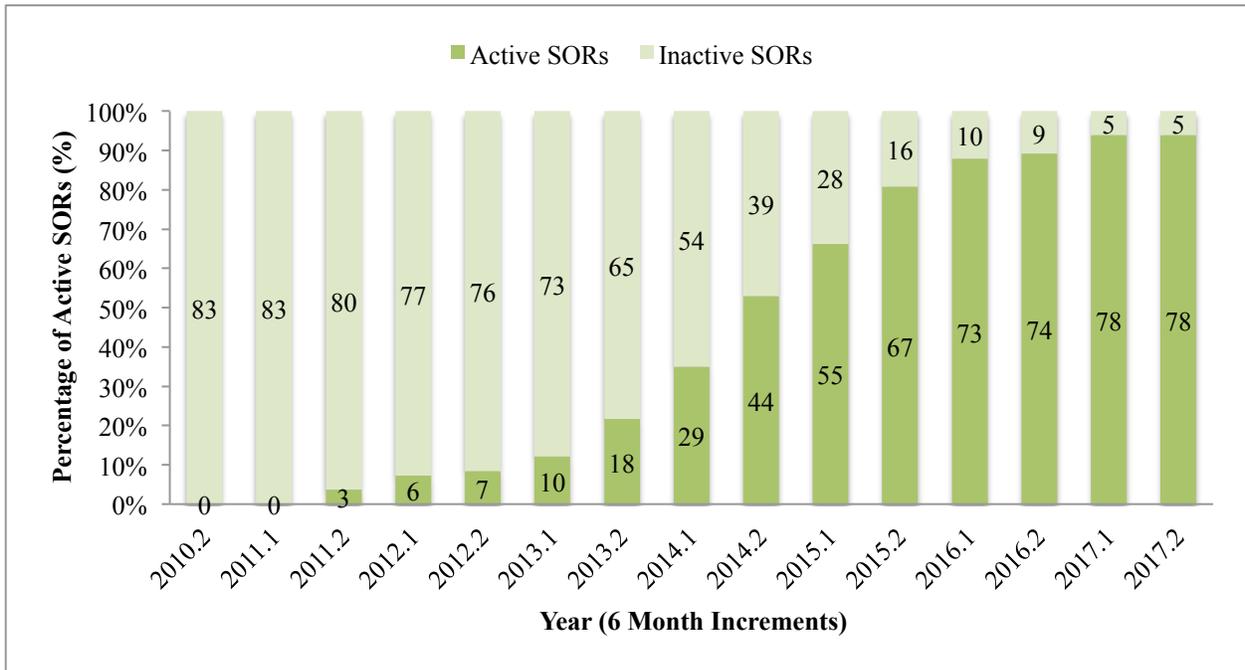
Timeline of 3TG Smelter or Refiner Active Dates



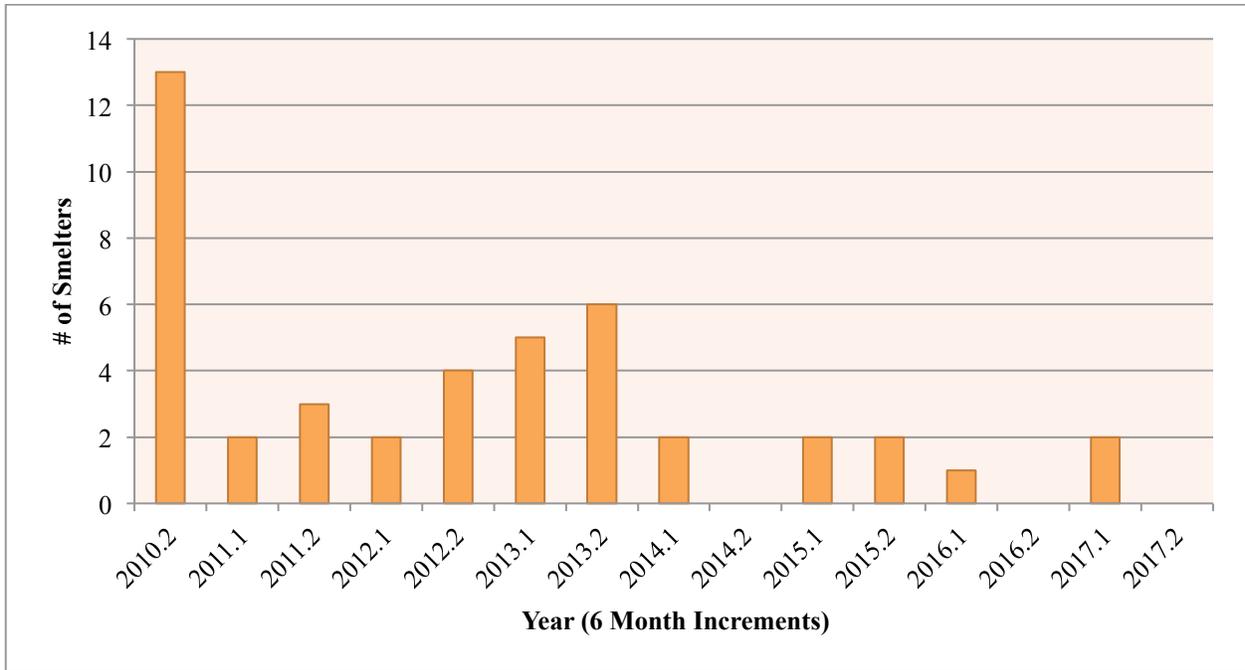
Percentage of 3TG SORs Participating in the CFSP.



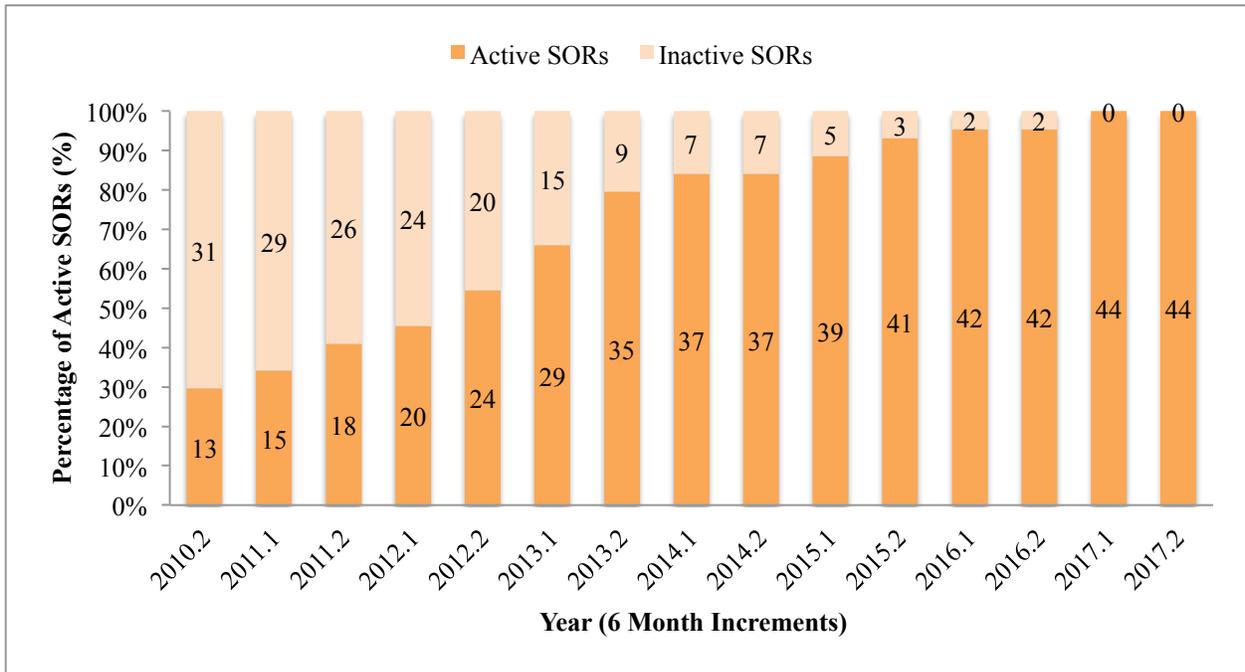
Timeline of Tin Smelter or Refiner Active Dates



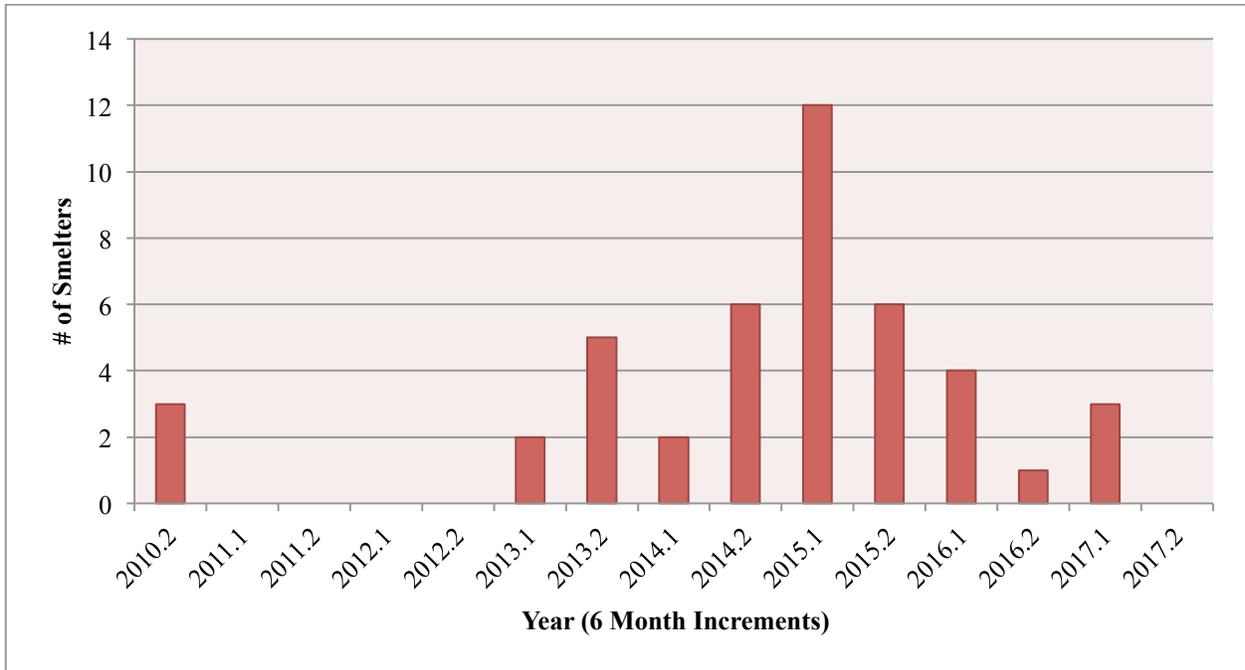
Timeline of Tin Smelter or Refiner Participation in the CFSP



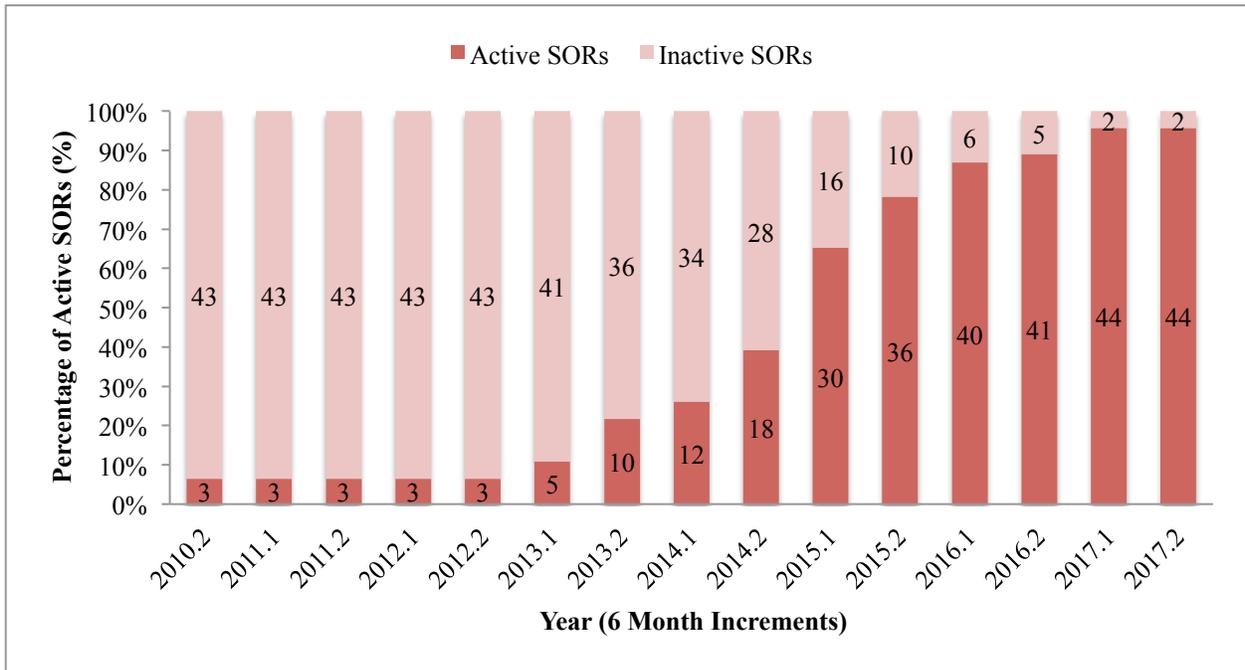
Timeline of Tantalum Smelter or Refiner Active Dates



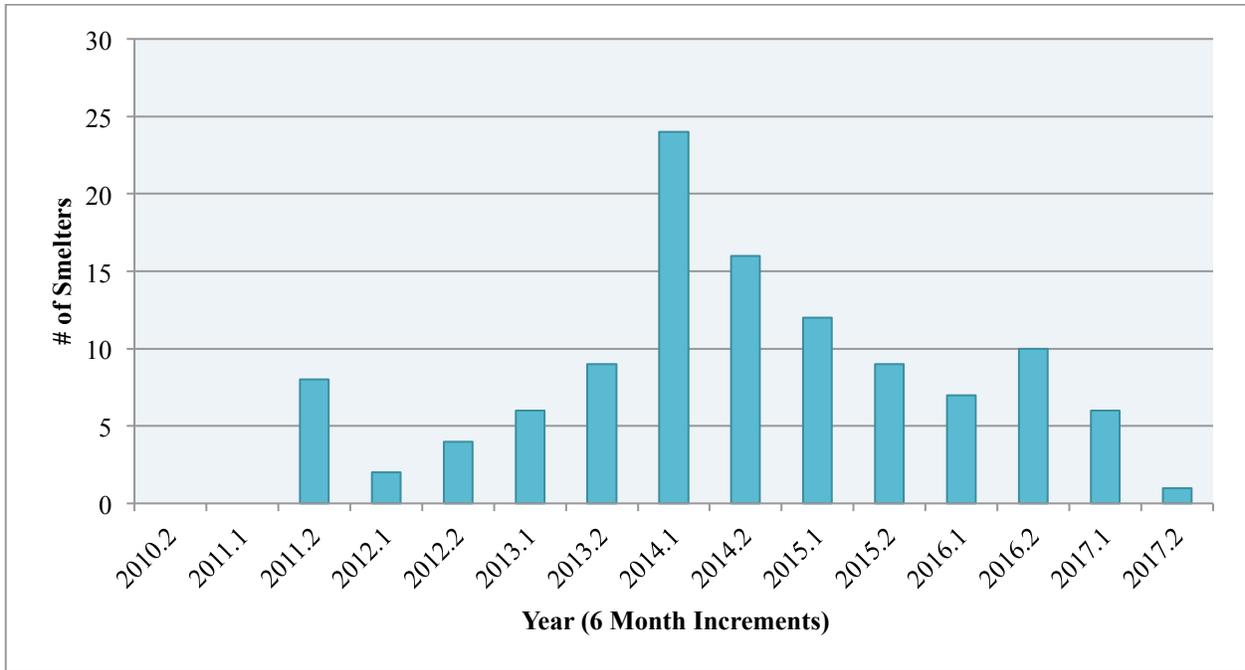
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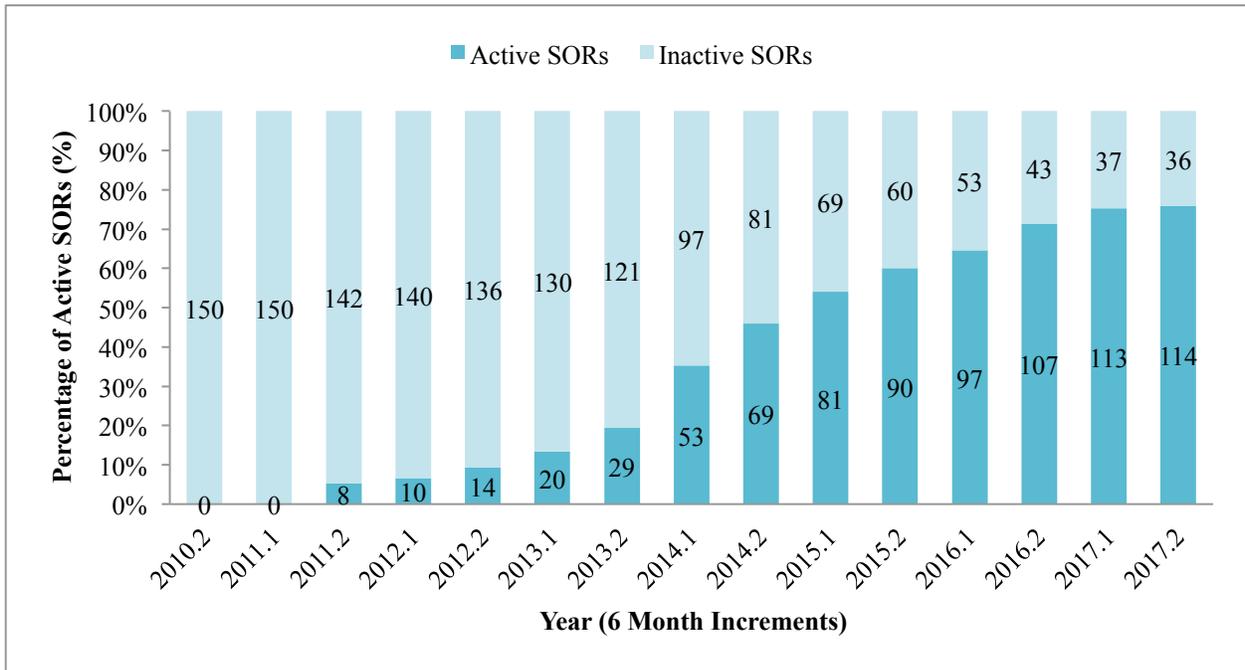
Timeline of Tungsten Smelter or Refiner Active Dates



Timeline of Tungsten Smelter or Refiner Participation in the CFSP



Timeline of Gold Smelter or Refiner Active Dates



Timeline of Gold Refiner Participation in the CFSP