

Corporate Social Performance of Firms in Conflict Mineral Global Supply Chains

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.

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Abstract

The corporate social performance of a diverse group of firms in global supply chains was assessed. Corporate social responsibility (CSR) is a global issue that affects not only enterprises themselves, but also their suppliers, and requires firms to care about not only environmental issues but also social issues in their supply chains. Thus firms should deal with CSR issues via supply chain management to improve their corporate social performance. The work bridges a gap in management scholarship on CSR and supply chain management by addressing corporate social performance in supply chains.

The approach used is a statistical analysis of 215 metal smelters that have successfully implemented systems for management of social issues at their suppliers. Specifically, the social issue of interest is mining of minerals that finances warfare and results in severe human rights violations – the so-called conflict minerals problem associated with the human rights abuses in the Democratic Republic of Congo (DRC) and adjacent areas. The Conflict-Free Smelter Program (CFSP) is a response to these concerns for the extraction of tin, tantalum, tungsten and gold (3TG) minerals.

Two dependent variables were operationalised. The “commitment group” divides the compliant smelters into four groups based on their voluntary willingness to engage in the CFSP: leaders, followers, middle majority and laggards. The “implementation period” measures the number of days a firm took from committing to the CFSP standards to actually becoming compliant, thus representing a firm’s implementation performance. Four independent variables were assessed: firm location, firm ownership, management system experience, and firm size. The results for the commitment group generally align with the findings of previous scholars, that larger firms from developed countries are more inclined to do CSR. However, the results for the implementation period did not align with findings of previous scholars. Various explanations are considered and related to business scholarship and theory. The results imply that many kinds of firm can participate in corporate social performance initiatives and CSR initiatives could be applicable beyond the metal industry. Moreover, it is concluded that legislative and market forces can be effective drivers of

corporate social performance of firms in global supply chains, including small firms and companies in developing countries.

Key Words: Corporate social performance, Corporate social responsibility, Conflict minerals, Institutional theory, Stakeholder theory, Responsible sourcing, Supply Chain Management

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Chapter 1 Introduction

1.1 Research Context

Over the past decades, corporate social responsibility (CSR) has become increasingly important for firms to operate. However, CSR still has no consistent definition, and overlapping concepts for CSR include business ethics, sustainability, and stakeholder management (Carroll & Buchholtz, 2014). CSR is often conceptualized by the *triple bottom line* approach (Elkington, 1998), which distinguishes the environmental, social, and economic impacts of corporations (Hart & Caggiano, 2003; Bansal, 2005). A firm's implementation of CSR involves “actions that appear to further some social good, beyond the interests of the firm and that which is required by law” (McWilliams, Siegel, & Wright, 2006, p. 3). According to McWilliams et al. (2006), CSR encourages a firm to make a positive impact on the natural environment and in dealing with its relationships with stakeholders including investors, employees, clients and communities. Some researchers have stated that the construct of CSR today has two main characteristics: first, it illustrates the relationship between the business and the society; second, it refers to a firm's voluntary activities in both environmental and social aspects (Carroll and Buchholtz, 2000; McWilliams and Siegel, 2001; Commission of the European Communities, 2001; Hill et al., 2003; Marrewijk and Werre, 2003).

With the rapid globalization of society, CSR is not just a firm's in-house concern. CSR requires that a firm fulfill its responsibilities in environmental and labour practices during global trading (Jenkins, 2001; Maloni & Brown, 2006; Business for Social Responsibility, 2001; Pedersen & Neergaard, 2004; Jørgensen & Nielsen, 2001; Oxford Research, 2003; PricewaterhouseCoopers & DILF, 2004; Roberts, 2003). Each firm also has a responsibility for the practices of its global trading partners, including suppliers (Andersen and Skjoett-Larsen, 2009). *Supply chain management* (SCM) plays a significant part in helping a firm fulfill its social responsibilities. Corporations have to extend the reach of their CSR policies both to their overseas subsidiaries and their suppliers (Andersen & Skjoett-Larsen, 2009). *Sustainable supply chain management* (SSCM) addresses sustainability issues in sourcing. Both environmental impacts and social issues are addressed in the conceptual framework of SSCM. However, the current literature on SSCM mainly focuses on the environmental aspect,

and there is limited knowledge on the social aspect in SCM. Research on the management of social issues in SSCM lags far behind that on environmental issues (Yawar & Seuring, 2014). This situation has been gradually changing, and some studies now consider the social aspects in SCM, rather than only environmental issues (Seuring & Müller, 2008). These social aspects that exist in the supply chain include working conditions, child labour, human rights, health and safety, minority development, accessibility and gender discrimination (Yawar & Seuring, 2014).

Firms should deal with the social issues that may exist in supply chains to improve their social performance. CSR addresses both environmental performance and social performance (Carroll & Buchholtz, 2000; McWilliams & Siegel, 2001; Commission of the European Communities, 2001; Van Marrewijk & Werre, 2003). Wood (1991) described that corporate social performance is a configuration of principles of social responsibility and outcome of social relationship. Corporate social performance constitutes the social performance outcome (Wood, 1991). It is a significant outcome of social performance of a firm's undertaking of CSR activities (Wood, 1991; Wood, 2010). However, unlike environmental performance, corporate social performance is not easy to quantify, which is the main problem that needs to be faced in this thesis.

One specific social problem that arises in SCM is conflict mineral sourcing. Conflict minerals are illegally extracted from regions experiencing conflicts in Central Africa, mostly the Democratic Republic of Congo (DRC) and nine adjoining countries. The trade in these minerals is believed to fund rebel groups in the region who are propagating civil conflicts. The most common conflict minerals are tin, tungsten, tantalum, and gold (3TG), and they pass through a variety of intermediaries before being purchased by multinational electronics companies.

As conflict minerals are associated with severe social problems in the supply chain, efforts have been made to deal with these problems. Relevant legislative frameworks have been created, including the Dodd-Frank Section 1502 and the Organization for Economic Cooperation and Development (OECD) Due Diligence Guidance. Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act passed by the US Congress in 2010, aims at stopping the national army and rebel groups in the DRC and adjacent areas from

illegally using profits from the minerals trade to fund their fight. A disclosure requirement now mandates firms to determine whether their products contain conflict minerals during their supply chain due diligence (OECD, 2013). The OECD Due Diligence Guidance is a comprehensive CSR instrument to be formally negotiated and approved by governments aiming to have responsible supply chains when taking minerals from conflict-affected areas, it provides detailed suggestions to help conflict-mineral-related firms respect human rights and avoid increasing military conflicts through their mineral purchasing decisions and practices (OECD, 2013).

The Conflict-Free Smelter Program (CFSP) is a mechanism to help monitor the sourcing of metals and assist smelters in meeting the standards set out in the Dodd-Frank Section 1502 and the OECD Due Diligence Guidance (CFSI, 2015). These standards focus on reducing human rights abuse, and violence in conflict territories of and around the DRC (CFSI, 2015). The CFSP is a flagship program of the Conflict-Free Sourcing Initiative (CFSI), and it covers all 3TG smelters and refiners. Under the CFSP, audits of 3TG smelters and refiners are carried out by credible independent third-party auditors, and these smelters that meet the requirements of the audit protocols are validated as conflict free (CFSI, 2015).

CFSP participation reveals that a smelter or refiner realizes the significance of social issues in the business and its own social responsibility. Young and Dias (2012) stated that the CFSP represents “a novel mechanism of corporate social responsibility (CSR) and supply-chain sustainability management, which can be described as a Non-State Market-Driven initiative” (p1). Non-governmental organization stakeholders are not included in the program management but are formally consulted on a regular basis.

The list of firms in compliance with CFSP displays that smelters are a varied group, with different backgrounds, location, ownerships management system experience and sizes. The growth of CFSP compliancy among smelters is an example of CSR; that is these have engaged in a voluntary international responsibility initiative. By April 2016, two hundred and fifteen CFSP smelters had participated in CFSP. Of these 215, some smelters are from developed or developing countries; some are private, publicly traded, or state-owned; some smelters may or may not have implemented ISO standards; and some vary in size with the number of the staff they employ. Thus, an opportunity is raised that there some patterns behind the CFSP

participation of these smelters with such diverse composition.

In this thesis, data analysis is the major research methodology to test the relationship between these firm characteristics and corporate social performance. The data sample is the two hundred and fifteen firms in the compliant smelter list of CFSP by April, 2016. The findings of this thesis can be generalized from CFSP to other CSR initiatives of firms in other business sectors. The results from the two hundred and fifteen CFSP compliant smelters could be used as an example that can be expanded to improve social performance in other industries.

1.2 Thesis Structure

Chapter 2 reviews the theories which connect the drivers that propel firms to engage in CSR initiatives. Chapter 3 presents the findings of previous scholars on CSR and SCM and identifies conflict mineral sourcing as a significant social issue, and CFSP as a CSR management tool to cope with the problem. Chapter 4 presents the research questions and proposes the hypotheses based on the findings of previous scholars. Chapter 5 provides the methodology for this study. Chapter 6 presents the results of the data analysis and compares the results with the hypotheses. Chapter 7 compares results and findings of previous scholars, and implications and applications for future researches.

Chapter 2 Theoretical Framework

While a firm chooses to adopt CSR practices voluntarily, there exist institutional pressures (Zhu & Sarkis, 2007; Clappison, 2012; Minoja & Zollo 2012; Hallbäck, 2012), stakeholder pressures (Buysse & Verbeke, 2003; Eesley & Lenox, 2006; Sarkis et al., 2011), and firms vary in their resources and capacities (Darnall et al., 2008; Branco & Rodrigues, 2006) – all of which have been described to have significant effects on a firm's CSR adoption.

2.1 Institutional Theory

According to Hoffman (2015), “Institutional Theory emphasizes environmental problems as being not primarily technological or economic in character but behavioural and cultural” (p.9). Bazerman and Hoffman (1999) state that societal institutions direct the development of environmentally destructive behaviour which is caused by technological and economic activities. Institutional theory recognizes that social, economic, political and cultural norms constitute an institutional structure.

Some scholars have agreed that institutional pressure can be a driving force to impel management decision-makers of a firm to adopt CSR practices (Zhu & Sarkis, 2007; Clappison, 2012; Minoja & Zollo, 2012; Hallbäck, 2012; Fligsten, 2001; Roe, 1994). Institutional pressures on sustainable supply chain practices and performance include market, regulatory, and competitive advantage (Zhu & Sarkis, 2007).

- *Market pressure* is defined as the pressures from customers (Zhu & Sarkis, 2007). The market pressures will encourage organizations to enact policies about its positive or negative impact on the physical environment (Zhu & Sarkis, 2007). Because of the market pressures, firms will lose additional customers and which in turn, influences their economic performance, if they do not change their behaviour to what is favored by customers (Zhu & Sarkis, 2007).
- Although CSR is voluntary, *regulatory pressure* from the government can still push the firms to pursue CSR and implement CSR practice, so that the firms will fulfill their social responsibility (Clappison, 2012; Minoja & Zollo 2012; Hallbäck, 2012). Zhu

and Sarkis (2007) found that regulation is a main pressure for firms to adopt environmentally friendly practices (Zhu & Sarkis, 2007; Jennings & Zandbergen, 1995). Weaver, Trevino and Cochran (1999) found that institutional pressures from government impel firms to implement CSR programs. For instance, since 1977, China has greatly developed its environmental laws. The Chinese government has made environmental issues increasingly important in its economic development strategies. Additionally, new laws and policies have been created to protect the environment such as the Cleaner Production Promotion Law that mandates businesses to implement *environmental management systems* (EMS) (Zhu & Sarkis, 2007).

- *Competitive advantage* plays a significant role for corporate environmental response (Zhu & Sarkis, 2007). To increase its competitive advantage, firms choose to follow CSR standard, which can help attract more customers and investors, increasing their profits (Minoja & Zollo, 2012; Waddock & Graves, 1997).

2.2 Stakeholder Theory

Some scholars categorize stakeholders as either primary or secondary stakeholders (Darnall, Seol & Sarkis, 2009; Donaldson & Preston, 1995). Primary stakeholders include value chain participants from consumers to suppliers, and from management to non-management employees; secondary stakeholders (Mitchell, Agle, & Wood, 1997) are not directly involved in the firm's economic transaction, and they can be societal stakeholders (Henrique & Sadorsky, 1996) and environmental regulators. Other scholars (Daily & Huang, 2001; Hanna, Rocky Newman & Johnson, 2000; Sharma & Henriques, 2005; Seuring & Müller, 2008; Freeman, 1984) categorized stakeholders as either internal or external stakeholders. Internal stakeholders are employers and employees, who are the initiators and recipients of an organization's activities, such as proactive environmental activities (Daily & Huang, 2001; Hanna et al., 2000). According to Seuring and Müller (2008), external stakeholders include customers, government, and NGOs. Unlike internal stakeholders, external

stakeholders do not have the control of critical resources of the organizations (Sharma & Henriques, 2005; Freeman, 1984). Rather, they have the ability to regulate or stimulate the public opinion in favor of or in opposition to the organization's practices (Sharma & Henriques, 2005; Freeman, 1984).

Stakeholder pressure can be a significant driver for firms to adopt various sustainable practices (Buysse & Verbeke, 2003; Eesley & Lenox, 2006; Sarkis et al., 2011). Firms should not only pursue profits, but also present their ethical concern and inform their stakeholders that they should be socially responsible (Solomon & Lewis, 2002). According to Sarkis et al. (2011), there are two different stakeholder pressures: the pressures from government, which are significant drivers for firms to implement environmental proactive practices (Kilbourne, Beckmann & Thelen, 2002), and pressures from customers, which have driven the adoption of sustainability practices in SCM. By implementing proactive environmental practices, firms are able to establish collaborative relationships with government and customers and find more ways except regulatory that can encourage firms to have greater environmental improvements to address the concerns from both government and customers (Darnall, 2008; Sarkis et al, 2011).

Furthermore, requirements from customers and investors who want the companies to follow CSR standards can strongly push a firm to change itself to become more sustainable (Solomon & Lewis, 2002; Minoja, 2012). Exports and sales to foreign customers are an important driver that stimulate firms to adopt sustainability practices (Ball & Craig, 2010). Customers may require products that are more sustainable, more environmentally and socially friendly, while an investor wants the firms they invested into have a good social and environmental performance (Kim, 2009; Solomon & Lewis, 2002; Minoja & Zollo, 2012). Based on these arguments, it is concluded that stakeholder concern can be a significant driving force to prompt a firm to adopt sustainability practices to fulfill their social responsibility, and these concerns could be from investors, customers, suppliers and governments. Firms want to maintain the relationship with their stakeholders, especially investors and customers, so that they will not lose them in their business.

2.3 Resource-Based View

Resource-based view (RBV) is an approach to achieving a competitive advantage and it appeared in the 1980s and 1990s (Oliver, 1997). The RBV is established on the principle that competitiveness is a function of distinctive and valuable resources controlled by a firm (Oliver, 1997). Resources can refer to the assets of a firm, its capabilities to create benefits, and competitive advantage in the market (Oliver, 1997). Resources have been considered to be quite a significant factor to increase a firm's competitiveness (Gallego-Alvarez, 2011). Some scholars categorize the resources as tangible and intangible resources (Riahi-Belkaoui, 2003; Hall, 1992). *Tangible assets* are physical things that a firm has, including land, buildings, machinery, equipment and capital. These resources can be bought from the market, but they provide little advantage to the firms in the long run, because their competitors can soon obtain the same assets (Riahi-Belkaoui, 2003; Hall, 1992). *Intangible assets* are not physical ones but still can be owned by the firm. Typical intangible assets include brand reputation, trademarks, and intellectual property, such as patents (Riahi-Belkaoui, 2003; Hall, 1992). Unlike tangible resources, intangible resources are built over a long time, and it is also something that other firms cannot purchase from the market. If a firm possesses critical intangible resources that its competitors in the market cannot copy or purchase easily, the firm could obtain the competitive advantage in the market (Cho & Pucik, 2005). Intangible resources are usually within a firm and are the significant source of the firm's competitive advantage in market competition (Riahi-Belkaoui, 2003).

Resources can be used by firms to develop and implement their strategies (Branco & Rodrigues, 2006). Engaging in social responsibility activities has costs, such as purchasing environmentally friendly equipment, implementing strict quality controls, or new health, safety and environmental programs (Branco & Rodrigues, 2006). Darnall et al. (2008) state that organizational capabilities are required to adopt management systems and to implement sustainability practices in SCM. Hedström and Swedberg (1998) indicate that CSR initiatives could be a great opportunity that is currently available to firms to achieve greater success through new products and new technologies. If the firm owns these new products and technologies that other competitors do not have, the resources could be a great advantage that pushes the firm to take an active part in CSR initiatives (Hedstrom et al. (1998). The literature

identifies that a company must have resources to participate in CSR initiatives and, without adequate resources, it will not adopt CSR principles.

Chapter 3 Literature Review

3.1 Corporate Social Responsibility in Supply Chains

In recent years, increased globalization and continued outsourcing have stimulated industries to operate on a global supply chain (Andersen and Skjoett-Larsen, 2009). Corporate social responsibility (CSR) demands that firms fulfill their responsibilities for environmental and labour practices in their global trading (Business for Social Responsibility, 2001; Jenkins, 2001; Maloni & Brown, 2006; Pedersen & Neergaard, 2004; Jørgensen & Nielsen, 2001; Oxford Research, 2003; Roberts, 2003). Firms have to expand their CSR policies not only to overseas subsidiaries, but also to their global suppliers (Andersen & Skjoett-Larsen, 2009). Based on the arguments in the literature, CSR requires a firm to care about their environmental and labour practices, not only for themselves, but also for their global subsidiaries and suppliers.

3.2 Supply Chain Management

The development of supply chain management (SCM) has a history of over one hundred years. In the early 20th century, SCM theory focused on increasing operational efficiency and reducing waste (Zhu & Sarkis, 2007), mainly on efficient operations and processes. Environmental sustainability and the SCM has a history throughout decades, but the academic and management research that focuses on this field has had only ten to fifteen years (Ballou, 2006). In the early 1990s, the concepts of the environment and business, industrial ecology and industrial ecosystem research which was the basis of environmental supply chain management grew rapidly (Seuring, Sarkis, Müller & Rao, 2008). With the development of these concepts, SCM started to address environmental issues (Seuring et al, 2008; Andersen & Skjoett-Larsen, 2009).

As Seuring et al. (2008) mention, most of the early work of sustainability in SCM was to identify and describe how to achieve environmentally sound supply chain systems. During the early time, the concept of sustainability began to incrementally come into the corporate environmental management system (EMS) (Seuring et al, 2008). A complete sustainable supply chain management (SSCM) was developed to address both the economic and

environmental performance of a firm, and include the aspects of internal environmental management, green purchasing, eco-design, supply and demand sustainability, cooperation with customers, environmental purchasing and sustainable supply chain (Seuring & Müller, 2008; Sarkis & Zhu, 2007; Sarkis, Zhu & Lai, 2011). The literature on environmental issues in supply chains (Carter and Dresner, 2001; Zhu & Sarkis, 2007) stated that the impact of activities in supply chains on the natural environment should be considered when the managers make management decisions. SSCM addresses the environmental issues in the supply chain (Seuring & Müller, 2008). Specifically, SSCM takes a more holistic systems view on the total environmental impacts of the supply chain on resource consumption and ecological footprints (Sarkis, 2003; Bowen et al., 2001; Preuss, 2005)

Based on the arguments of the scholars, although the concept of SCM has been developed for a long time, the sustainability being integrated into SCM has developed only over one decade and recent literature on SSCM addresses more on economic and environmental issues in SCM.

3.3 Social Issues in Supply Chain Management (SCM)

Scholars have mentioned that social issues in SCM involve child labour, human rights, health and safety, development of minorities, disabled people inclusion and gender discrimination (Klassen & Vereecke, 2012; Yawar & Seuring, 2014; Seuring & Müller, 2008). It is evident that most SCM research is still influenced by environmental issues (Seuring & Müller, 2008). The concept of sustainability should not only include economic and environmental issues, but also include social issues (Seuring & Müller, 2008). Andersen and Skjoett-Larsen (2009) also stated that CSR is a broader concept to a firm's overall treatment of both human beings and the environment, not just limited to the supply chain. However, the integration of economic, environmental, and social aspects, which are three dimensions of sustainability is still rare in current academic papers. Management of social issues is far behind the economic and environmental issue in the supply chain (Klassen & Vereecke, 2012; Seuring & Müller, 2008).

Nevertheless, in recent years, there has been a gradual increase in the quantity of literature

associated with social issues in sustainability performance of firms (Yawar & Seuring, 2015). Wood (1991) emphasized that the identification of social issues is a significant aspect of CSR. Environmental and social criteria should be fulfilled at the same time by supply chain members, so that the sustainability can remain within the supply chain comprehensively (Seuring & Müller, 2008). Therefore, social performance should be addressed in the same way as environmental performance. Environmental performance is often addressed in the current research on CSR, and is usually quantified by energy efficiency, emission reduction and pollution prevention. Corporate social performance constitutes the social performance outcome of firms' participation in CSR activities, and it has value creation and business care (Wood, 1991; Wood, 2010). However, corporate social performance is difficult to quantify, as measures are lacking or limited. This difficulty is addressed in the methodology of this study.

3.4 Conflict Mineral Sourcing

Conflict mineral extraction is an important social issue that has emerged over the last decade in supply chains. Conflict minerals are minerals extracted in a conflict zone and selling minerals extracted from these areas will support the local conflicts (DiJohn, 2002). Statistical evidence indicates that belligerent groups in conflict zones have accessibility to precious commodities, so that they can increase the conflicts (DiJohn, 2002). The most critical example is the eastern provinces of the Democratic Republic of the Congo (DRC) and adjacent areas, where various armies, rebel groups get the benefits from selling minerals and contribute to violence and human rights abuse during wars in these regions (Young, Zhe, & Dias, 2014). The most significant mined conflict minerals contain tin, tungsten, tantalum, and gold (Young, 2015; Young et al., 2014), called the 3TGs.

Social issues are a severe problem in conflict-affected areas, which is revealed in conflict mineral sourcing (Kalisya, et al., 2011; Jenkins, 2014). In conflict mineral sourcing, typical social problems, such as human rights abuse, working conditions and child labour problems are especially shocking (Kalisya, Justin, Kimona, Nyavandu, Eugenie, Jonathan & Hawkes, 2011; Jenkins, 2014). Human rights are not respected in these conflict areas. The labourers who work in the mines controlled by war belligerent groups are not protected under the law,

because there is not effective enforcement of government legislation. Furthermore, a safe and health working condition cannot be ensured; for labourers who work in such mines, health and safety are not considered by the army groups as they are forced by belligerent groups to work (Kalisya, et al., 2011; Jenkins, 2014). Therefore, sourcing of conflict minerals in these groups controlled areas is seriously harmful to the society and human rights, and the sourcing in conflict areas as a very specific issue that addresses one area of social sustainability should be paid attention (Young, et al., 2014).

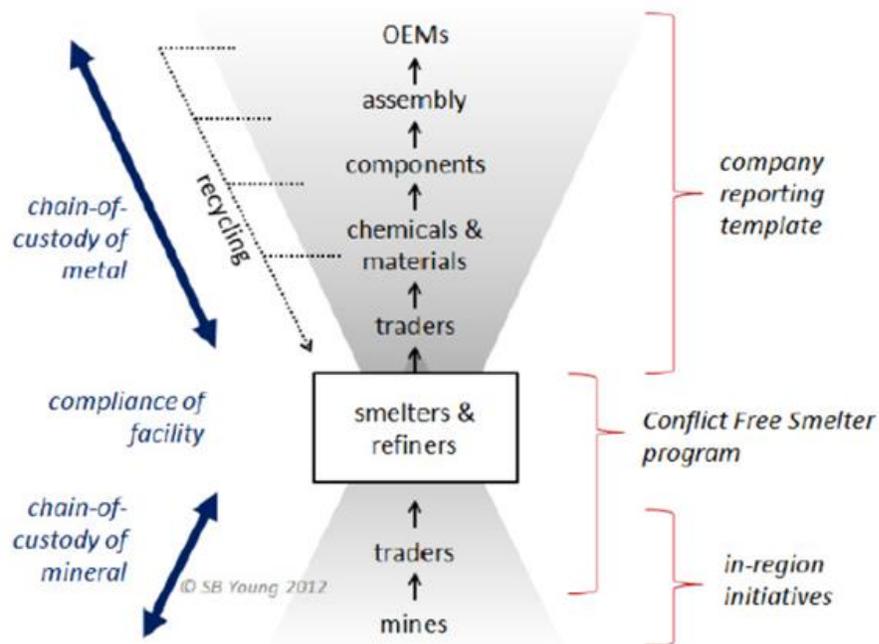


Figure 1. Supply Chain of the 3TG Metals (Young et al., 2014)

To understand the social issues in the conflict mineral sourcing, it is necessary to determine the tiers of the supply chain of conflict mineral related products. Figure 1 displays the process of metals being collected from the ground and finally assembled by the Original Equipment Manufacturers (OEM), revealing that the supply chain is complex. There are quite a number of actors and layers (as many as eight tiers) involving various suppliers in the world (Young et al., 2014). First, the minerals are sourced from various mines that are located in different countries throughout the world. After being sourced from the ground, these minerals are

delivered or traded to smelters. Some smelters have their own mines, so that they can use the minerals from their mines directly. For smelters who do not own mines, they trade with mining companies or other traders. Smelters and refiners source the metal ore or purchases from traders, and produce metals or their compounds; the smelted or refined metals are sold to traders, and go through the tiers of chemicals and materials, components, assembly, and finally flow to the OEMs. OEMs refer to the firms that make a part or subsystem that is used in another firm's end product (Chien & Shih, 2007). Figure 1 implies that OEMs are the peak of the supply chain. The metals or other compounds are purchased from smelters and refiners by various traders and are made as different components, which are finally assembled to make electronic products, such as laptops and smartphones (Young & Dias, 2012). As these electronic products are widely used in the world, massive conflict minerals are in great demand. Because of the high volume of conflict minerals demand, which potentially increases the seriousness of social issues caused by conflict mineral sourcing. Materials are mixed in production processing stages of smelters and refiners in the metal supply chain (Young & Dias, 2011). At this chokepoint, mineral ores and concentrates originating from different part of the world are processed and refined to produce the crude or refined metals used in products and product components, which are purchased by different traders and finally obtained by OEMs (Young et al., 2008).

3.5 Solutions to Conflict Sourcing

To solve the social issues brought by conflict mineral sourcing, many efforts have been made. Achieving conflict-free sources of minerals, and thus, products must be a result of combined efforts of governments, international organizations and private sectors.

3.5.1 Dodd-Frank Wall Street Reform and Consumer Protection Act Section 1502

The Dodd-Frank Wall Street Reform and Consumer Protection Act, passed by the US Congress in July 2010, includes a provision, section 1502, which is a disclosure requirement that calls on US firms to determine whether their products contain conflict minerals. This

section requires US firms to carry out supply chain due diligence and to report to the Securities and Exchange Commission (SEC) (Linnecke, 2016).

3.5.2 The Organization for Economic Cooperation and Development

The Organization for Economic Cooperation and Development (OECD) is an organization in which the governments of thirty-four democratic market economies work with each other, and also include more than seventy non-member economies to promote economic growth and sustainable development (OECD, 2011). The OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from conflict-affected and high-risk areas is the first example of a collaborative multi-stakeholder initiative on responsible supply chain management of minerals from conflict-affected areas, which is supported by governments (OECD, 2011). The objective of the guidance is to lead firms to respect human rights and avoid contributing to conflicts in high-risk areas through adjusting their mineral sourcing practices (OECD, 2011). This guidance is intended to create transparent mineral supply chains and sustainable corporate engagement in the mineral sector and enable countries that have conflict areas to benefit from their mineral resources and preventing the extraction and trade of minerals from becoming the cause of military conflict that result in human rights abuses and other violations. With additional documentary supplements on tin and tantalum, tungsten, and gold, the OECD Due Diligence Guidance provides firms with a complete framework to source minerals responsibly in order for trade in those minerals to support peace and development and not conflict in DRC and adjacent regions (OECD, 2011).

3.5.3 Conflict-Free Smelter Program

Conflict-Free Smelter Program (CFSP) is the flagship program of Conflict -Free Sourcing Initiative (CFSI) developed by the Electronic Industry Citizenship Coalition (EICC) and Global e-Sustainability Initiative (GeSI). Founded in 2004 by a group of leading electronics companies, the EICC is a nonprofit alliance of electronics firms committed to supporting the rights and well-being of labours and communities that are associated with the global electronics

supply chain worldwide; the GeSI is an entity that provides objective information, resources and best practices, aiming to achieve integrated social and environmental sustainability (EICC and GeSI, 2012).

CFSP runs in parallel to efforts by government and non-governmental groups, including the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals and the United States 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act Section 1502 (Young & Dias, 2012). The CFSP provides assurances on the sources of strategic resources that contain metals which are used in final electronic products. The CFSP was established as a response to concerns in DRC (Young & Dias, 2012).

CFSP focuses on the sourcing performance of smelters and refiners all over the world (CFSI, 2013). Smelters and refiners are globally distributed, located in such countries as Australia, Canada, China, Indonesia, Japan, Malaysia, Russia, United States, and others (CFSI, 2013). As a voluntary initiative, CFSP aims to trace and audit the mineral sources of these smelters and refiners, in which 1an independent third party audits smelter or refiner procurement and tolling activities and determines if the smelter or refiner demonstrated that all the minerals the processed originated from conflict-free sources. CFSP uses an independent third-party audit to identify smelters and refiners that have systems in place to assure sourcing of only conflict-free materials (CFSI, 2013). The audit protocol is developed based on global standards including the U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act and the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from conflict-affected and high-risk areas (CFSI, 2013). An audit validates that each smelter facility has implemented necessary due diligence procedures by first verifying the company management processes, then evaluating implementation of those processes with spot checks of those processes and their purchasing practices (CFSI, 2013). If the smelter shows sufficient documentation to demonstrate with reasonable confidence that the minerals they processed originated from conflict-free sources, then the smelter is compliant to the standards within the protocol and is listed as a CFSP compliant smelter (CFSI, 2013).

3.5.4 Other Initiatives

Additionally, there are other initiatives similar to the CFSP. These include efforts by the London Bullion Market Association (LBMA), Responsible Jewellery Council (RJC) and Tungsten Industry—Conflict Minerals Council (TI-CMC). LBMA and RJC each manage responsible sourcing initiatives for gold supply chains (LBMA, 2011; RJC, 2009). TI-CMC is a conflict free initiative that provides “a method for facilitating compliance with reasonable country of origin inquiries within the tungsten industry while protecting confidential, sensitive, and proprietary information relating to members' supply chains of Tungsten” (TI-CMC, 2016). The LBMA comprises and represents key players and their clients in the bullion market, which is centered in London but which has an international footprint (LBMA, 2011). The Responsible Jewellery Council (RJC) is a whole-of-supply chain standards initiative for the jewellery supply chain. It is in its participation of organizations at every step of the value chain, each bringing a commitment to a responsible supply chain and implementation of responsible business (RJC, 2009). The RJC Chain-of-Custody (COC) Standard builds on the RJC Code of Practice, aiming to address conflict issues at the chokepoint of refiners.

These three related responsible sourcing initiatives are all recognized by CFSP, and smelters that have participated in and successfully complied to these initiatives are considered and recorded as compliant smelters by CFSP.

3.5.5 CFSP as a CSR Management Tool

Participating in CFSP implies that a firm realizes the significance of social performance in its social responsibility. The CFSP is a non-state voluntary program. As Young and Dias (2012) state, CFSP represents a mechanism of CSR in SSCM; it can be described as a CSR initiative that is launched by industry associations, and stakeholder groups. The CFSP aims to control aspects of social performance of the firms that are many tiers deep in the OEM's supply chain, so that the social issues of conflict mineral sourcing are far removed from the electronic sectors (Young & Dias, 2012). The CFSP is distinct as a governance system. It is a CSR management system, which requires participants to make commitments and implement policies in a typical

CSR topic.

3.6 Research Opportunities

Based on the current literature, the consideration of social aspects in SSCM research lags behind understanding of environmental aspects in supply chain. As a significant part of CSR, firms' social performance is not fully addressed as environmental performance. To bridge the gap, this study addresses the significance of corporate social performance. According to previous scholars (Young & Dias, 2011; Young et al., 2014; Young, 2015), the conflict mineral issue has become a severe social problem in the SCM. Dodd-Frank Section 1502, and the OECD Due Diligence Guidance have been established to deal with this social problem, and to contribute to responsible sourcing (CFSI, 2013; OECD, 2011). Moreover, CFSP is launched and tries to engage all smelters and refiners in the global metal supply chain in conflict-free sourcing.

The dataset represented by the CFSP and firms that have met its CSR standards provides a novel and comprehensive picture of management of social issues in SSCM. Specifically, in CFSP, there is a large number of compliant smelters and refiners that have different backgrounds. For example, these compliant smelters are from different countries in the world; some of them are from developed countries, such as the US and Germany. However, a high proportion of smelters are from developing countries, such as China and Indonesia. In addition, these compliant smelters contain a mix of various ownership structures (private, publicly traded and state-owned). In addition, these compliant smelters and refiners present a mix of sophistication, for example whether having or not having formal management systems such as ISO 14001 and ISO 9001. Furthermore, for these compliant smelters, their firm sizes are quite different. A high percentage of compliant smelters are tiny; some of them have only twelve employees, such as Indonesia private smelters; some of them are giants, such as one Chinese state-owned smelter that has 177,000 employees (see Appendix A).

Because of the diverse backgrounds of these smelters and refiners and their significant positions in a complex global supply chain, there is a research opportunity to determine how

company characteristics relate to a firm's CSR adoption; therefore, the thesis examines a firm's corporate social performance using CFSP participation as an indicator of its CSR compliance and thereby contributes to the current literature on SCM

Chapter 4 Research Objective

4.1 Research Questions

This work considers the characteristics and capabilities of diverse firms that engage in global corporate social responsibility (CSR) initiatives. This thesis focuses on the corporate social performance of firms, to bridge the gap that research on the social aspect in supply chain management (SCM) still lags far behind that on the environmental aspect. Under this general objective, several research questions result:

1. How does corporate social performance vary for firms in developed countries versus developing countries?
2. How does corporate social performance vary from firms with concentrated ownership to firms with dispersed ownership?
3. How does corporate social performance vary from firms with management system experience to firms without management system (MS) experience?
4. How does corporate social performance vary from larger firms to smaller firms?

4.2 Hypotheses

4.2.1 Firm Location

With globalization, trading interactions frequently happen between countries. However, the levels of CSR development between developing and developed countries are different. Previous scholars indicated that firms in developed countries are more active in CSR activities than firms from developing countries (Dobers & Halme, 2009; UNDESA, 2007). According to the United Nations Department of Economic and Social Affairs (2007), CSR agendas in middle and low-income countries have been less visible internationally than high-income countries, as the concept of CSR is more largely framed in developed countries than in developing countries (UNDESA, 2007). CSR is introduced through global trade by foreign customers, and then becomes internationalized and expands to developing countries through global trade, investment, and development assistance (UNDESA, 2007). Although firms in

developing countries are beginning to accept CSR, developing countries still lag behind developed countries (Dobers& Halme., 2009; UNDESA, 2007). For example, China has a significant role in the global economy, but environmental performance in business operations is still under-developed in China; sustainability in SCM is relatively novel and considered a kind of “innovation” in China (Zhu, Sarkis & Lai, 2012). What is more, social and environmental crises more often occur in developing countries (World Bank, 2005; United Nations Development Programme, 2006). According to scholars on Institutional Theory (Clappison; Minoja & Zollo, 2012; Zhu & Sarkis, 2007), the regulatory pressure is a significant driver for firms to implement CSR practices. It will influence whether a manager of a firm to adopt CSR practices. The legislation in developing countries are less powerful than CSR standards, compared to what in developed countries (UNDESA, 2007). For example, CSR reporting environmental and social issues is a significant subject of legislation in developed countries (UNDESA, 2007).

Based on the arguments presented in the literature, CSR is well-framed in developed countries, then accepted by other societies or businesses in developing countries through international trade, investment, and international development aid. CSR in developing countries is still under-developed and thereby is far behind developed countries. As corporate social performance is a significant outcome of social performance of a firm’s undertaking of CSR activities (Wood, 1991; Wood, 2010), it is reasonable to assume that corporate social performance in developing countries similarly lags behind that in developed countries. Therefore, the thesis proposes that:

Hypothesis 1a: Firm location is associated with a firm’s corporate social performance.

Hypothesis 1b: Firms from developed countries have higher level of corporate social performance than firms from developing countries.

4.2.2 Firm Ownership

According to the literature, the three most common types of firm ownership are privately-owned, state-owned and publicly traded (Jermakowicz& Gornik-Tomaszewski, 2006;

UNDESA, 2007). Privately-owned firms are controlled by a small group of shareholders or firm members, and they do not provide or trade stocks to the public on the stock exchange markets (Jermakowicz, & Gornik-Tomaszewski, 2006). State-owned firms are identified as legal entities that undertake commercial activities on behalf of a government owner (Choi, Lee & Williams, 2011). Publicly traded firms, which are also called publicly held firms or public corporations, are firms whose ownership is dispersed among the public in shares of stocks, and they can be traded freely on the stock exchange markets and therefore have many owners (Jermakowicz, E. K., & Gornik-Tomaszewski, S., 2006).

Based on Stakeholder Theory, stakeholder pressure can be a significant driver for firms to adopt various sustainable practices (Buysse & Verbeke, 2003; Eesley & Lenox, 2006; Sarkis et al., 2011). McWilliams and Siegel (2001) state that in a firm, major owners of a firm can have the power to propose and vote on a firm's strategic decisions to invest. Thus, given that CSR can be seen as a kind of investment, it is reasonable that the major owners of a firm have a greater chance in making decisions on whether to invest in CSR or not. CSR adoption of firms with various ownership structures should therefore be different, and this has been explored in research (Oh, Chang & Martynov, 2011; Keim, 1978; Ullmann, 1985). Previous literature supports the argument that if a firm's ownership is more dispersed, the CSR level increases (Keim, 1978; Ullmann, 1985; Oh, Chang & Martynov, 2011). Privately-owned firms are controlled by a small group of shareholders or firm members, usually top managers who have the authority to allocate firm resources. Private firm owners are usually less likely to pursue CSR, as it depends on the firm owner's willingness (UNDESA, 2007; Choi et al., 2011). Managers owning a firm may have a negative effect on a firm's CSR adoption (Oh, Chang & Martynov, 2011). Moreover, in some Asian countries, such as China, Japan and Korea, some managers of private firms may have a strong relationship with the founding family (Claessens, Djankov, & Lang, 2000), which may cause a negative influence on the decision-making process. Managers who are strongly related to the founding family may adopt policies that benefit the family and ignore the concerns from the other stakeholders (Oh, Chang & Martynov, 2011) If CSR practices do not bring profits to the families directly, the managers will not adopt the CSR principles.

State-owned firms' profitable activities are on behalf of governments (Choi et al., 2011).

Because they represent the government, these firms are obliged to contribute to the community and protect its environment according to the laws and policies of their governments (UNDESA, 2007; Choi et al., 2011). However, Frye and Shleifer (1997) found that state-owned firms are not prepared to adopt CSR practices because the government may push firms for the benefit of politicians and bureaucrats. Therefore, CSR adoption by a state-owned firm largely depends on its government's willingness.

For publicly traded firms, their shareholders have the rights to allocate resources and make decisions. The drivers for CSR of publicly traded firms are mainly from the shareholder's interest and pressures (CIMA, 2004). Moreover, higher levels of investment from abroad might indicate a greater impact of CSR requirements from foreign investors (Oh, Chang & Martynov, 2011). Ullmann (1985) also states that firms with dispersed ownership will be more likely to address investor' concerns on corporate social issues and to implement social responsibility activities. Facing pressures from a wide range of stakeholders, publicly traded firms are more likely to adopt CSR initiatives.

Based on the arguments of the literature, a firm's CSR behaviour is related to its ownership structure. If a firm's ownership is more dispersed, its CSR level should become higher (Keim, 1978; Ullmann, 1985). As corporate social performance is a significant part of a firm's CSR, it is reasonable that firms with more dispersed ownership have a greater level of corporate social performance than those with more concentrated ownership. Therefore, we propose that:

Hypothesis 2a: Firm ownership is associated with a firm's corporate social performance.

Hypothesis 2b: Firms with more dispersed ownership have higher level of corporate social performance than firms with concentrated ownership.

4.2.3 Management Systems Experience

A management system (MS) is a framework of procedures and processes that are used to ensure that an organization can achieve its objectives (Colianese & Nash, 2001). A MS should include the four ISO key elements of "Plan/Do/Check/Act" (PDCA) (ISO, 2001). Plan refers

to establishing baselines, identifying potential and actual sustainability impacts, and establishing goals and targets. Doing (Do) refers to implementing action plans to achieve the goals. Checking (Check) refers to examining and recording progress, and taking preventive and corrective action as needed. Acting (Act) means to evaluate the overall progress and systems and to make changes to the MS as needed (ISO, 2001). Typical management systems include a quality management system, an environmental management system, or a health and safety management system (Fresner & Engelhardt, 2004). Quality management systems which are based on ISO 9000, help firms make products of better quality, with greater efficiency and higher added value; they also develop greater customer satisfaction and generate more profits (Zwetsloot, 2003). Environmental management systems, which are based on ISO 14001, help firms to improve their environmental performance, and increase their eco-efficiency (Zwetsloot, 2003). Health and safety management systems are based on OHSAS 18001 and help firms create safe and healthy workplaces and improved industrial relations (Zwetsloot, 2003). Zwetsloot (2003) states that the implementation of management systems creates benefits for quality environment and human health and safety.

Zwetsloot's study demonstrates that the value and guidelines of the management systems are associated with CSR. In his study, three business principles that are relevant to both CSR and management systems are mentioned: (1) *doing things right the first time*; (2) *doing the right things*; and (3) *continuous improvement and innovation*. Zwetsloot continues to identify that the existing management systems focus on rational control (*doing things right*), which is limited in the development of CSR; the value of doing *the right things* is relevant to CSR and provides more than the current ISO management systems require. Zwetsloot also concludes that development of CSR is significantly related to the value of rationalities of implementing management systems; management systems focus on prevention, while CSR requires more than prevention and has a stronger focus on a firm's innovation on improving social performance.

Many scholars use the presence of an environmental management system (EMS) as a proxy to test the effects on implementing CSR. (Darnall & Kim, 2012; Darnall, et al, 2008; Darnall & Edwards, 2006; Darnall, 2006). Firms that have ISO 14001 certification may receive strategic benefits in that certification to the international standard requires that firms should

constantly examine their internal operations, engage employees in coping with firms' environmental issues, continually monitor operation progresses, and increase their knowledge about efficient operations (Darnall & Edwards, 2006). According to Darnall & Kim (2012), firms that have an EMS are more likely to adopt advanced environmental strategies that are built on pollution prevention principles. Darnall et al. (2008) stated, EMS adopters may have a greater tendency to utilize sustainable practices to reduce negative environmental impacts in supply chain management. Moreover, according to a perspective from RBV, organizations that have adopted EMSs may possess capabilities to implement sustainable practices in supply chain management (Darnall et al., 2008). Also, EMS may encourage some organizations to expand their environmental consideration from their internal operations and request their suppliers and customers to do the same (Darnall, 2006).

Based on the arguments, it is reasonable that management systems have a high correlation to a firm's CSR adoption. The basic values and guidelines of a management system are critical to the implementation and development of CSR. In addition, firms with management systems are more likely to have adequate resources and capabilities to participate in CSR initiatives. As corporate social performance is also significant part of CSR besides environmental performance, it is reasonable that firms with MS experience have a greater level of corporate social performance than those with MS experience. Therefore, this thesis proposes that:

Hypothesis 3a: Managements system (MS) experience is associated with a firm's corporate social performance.

Hypothesis 3b: Firms with MS experience higher level of corporate social performance than firms without MS experience.

4.2.4 Firm Size

Scholars (Branco & Rodrigues, 2006; Edwards, Marginson, Edwards, Ferner & Tregaskis, 2007; Russo and Fouts, 1997; Ciliberti, Pontrandolfo & Scozzi, 2008) have shown that firm size is a significant factor that will impact a firm's CSR performance. According to scholars on RBV (Branco & Rodrigues, 2006; Barney, 1991; Zhu et al., 2008; Bianchi & Noci, 1998),

larger firms have more resources and capacities to implement CSR practices and have more social responsibilities than smaller firms. Zhu et al. (2008) state that differences among organization sizes influence their sustainability strategies implementation. Barney (1991) stated that larger firms usually have more financial resources to cope with environmental issues than smaller firms. Moreover, larger firms will face more pressures from legislation and stakeholders because of their own economic strength and complicated relationship in the market, and are therefore expected to reach higher standards of CSR than smaller firms (Russo & Fouts, 1997).

Unlike larger firms, lack of resources could be a major barrier for CSR implementation of smaller firms (Bianchi & Noci, 1998). Bianchi & Noci (1998) revealed that smaller firms are less likely to invest in environmental and other sustainability practices that have long-term strategic benefits, because resources, such as labour, time and costs, are admittedly more constrained (Bianchi & Noci, 1998). Because of having limited resources, it is impossible for smaller firms to invest much in sustainability practices that can bring strategic benefits in the long run. Nevertheless, according to Besser (1999), smaller firms prefer attracting customers and employees from the local community; a good reputation is meaningful to small business success and smaller firms are likely to be more responsive to stakeholder concerns to build a positive public image and maintain a good relationship with the local community.

Based on the arguments of previous scholars, it is reasonable that larger firms are more likely to have higher CSR adoption rates than smaller firms. Smaller firms are more likely to be responsive to stakeholders' concerns than larger firms for a better reputation, but they do not have as much resources as large firms to support CSR practices. As corporate social performance is a significant part of CSR, it is reasonable that larger firms have the resources and capability to improve both their environmental performance and social performance. Therefore, this thesis proposes that:

Hypothesis 4a: Firm size is associated with a firm's corporate social performance.

Hypothesis 4b: Larger firms have higher level of corporate social performance than smaller firms.

Chapter 5 Methodology

The general approach used throughout this study is statistical analysis. The data analysis aims to correlate CSR behaviour with independent variables that describe firms. In this study, CFSP participation is utilized as a measurement of corporate social performance. As mentioned in Section 3.5.5, CFSP represents a mechanism of CSR and supply-chain sustainability management (Young & Dias, 2012), and participating in CFSP requires a firm to make commitments and implement policies in mineral sourcing. Generally, gold is the odd one out because it is less currently covered by the certification programs, whereas the 3Ts have already been largely covered by CFSP. For tantalum, under CFSP, about 99% of the reported tantalum mineral produced was covered by 2014 (Achebe, 2016). It is clear that most tantalum smelters have proven that their sources are conflict-free. For tin, by the end of 2014, 40 % of known tin producers participated in the CFSP (Young, 2015). For tungsten, which was the last of the all 3TG sectors to participate in the CFSP, there are only about fifty smelters worldwide. Of these, twenty-nine of the major companies (including most of the Western producers) in tungsten industry are participating as of 2014 in the CFSP (Young, 2015). Non-engaged firms are mostly small and Chinese based. For gold, the gold sector has the greatest number of firms compliant to the CFSP, with about eighty of the one hundred and fifty firms identified (Young, 2015), including most major refiners worldwide.

The datasets that are used in this study describe two hundred and fifteen (215) 3TG smelters and refiners that are compliant with the CFSP by April 2016. The reason for only including this group is the data of these firms were readily available on a consistent basis. Dependent variables and independent variables are defined in this chapter. The dependent variables include Commitment Group and implementation period. Independent variables are firm location, firm ownership, management system (MS) experience and firm size. The data of dependent variables collected are from several major conflict free programs, including CFSI, LBMA, RJC and TI-CMC; the data of independent variables are collected from company website, annual reports, and Google Finance.

Table 1. Summary of Facilities in Research Sample

	Tin	Tantalum	Tungsten	Gold	Total
N	59	46	29	81	215
Developed Countries	10	23	10	58	101
Developing Countries	49	23	19	23	114
Private	52	33	18	46	149
Publicly Traded	6	10	6	29	51
State-owned	1	3	5	6	15
MS	18	36	22	42	118
Non-MS	41	10	7	39	97

Table 1 displays the number of firms with different characteristics for each metal and in total. The two hundred and fifteen compliant smelters are of various backgrounds, including firms from different countries (developing countries or developed countries) with different ownership structures (private, publicly traded or state-owned), and whether the firm implement MS or not.

5.1 Measures

In this section, dependent variables and independent variables that are used in the data analysis are introduced. A discussion of the variables and rationale for choosing these variables to test the hypotheses is presented. In addition, data sources where information is collected are described in detail. Finally, the data analysis to test the hypotheses in this study is described.

5.1.1 Dependent Variables

Figure 2 displays how a smelter or refiner becomes compliant with the CFSP. To become a compliant smelter or refiner, the decision-makers of a smelter or refiner has to first commit to follow the protocol standards that are required by CFSP. However, commitment is just the first step of adopting the CFSP. It is also significant for a smelter to implement the standards that it

has committed to modify their sourcing practices.

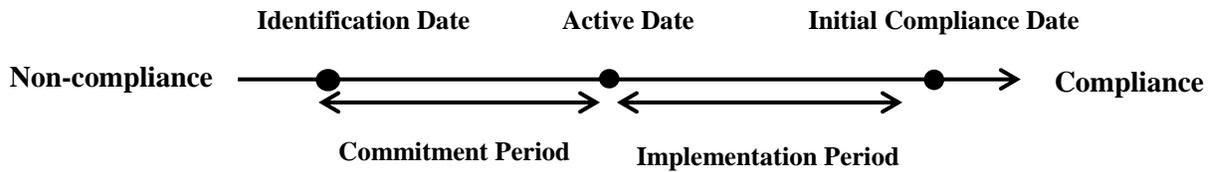


Figure 2. Process from Non-compliance to Compliance of a Firm in CFSP

There are three important dates for this process, the identification date, active date and initial compliance date.

- *Identification date* is the first date that a firm is identified as a smelter by the CFSP. After the firms are identified, they are contacted and encouraged to participate in the CFSP.
- *Active date* is the date when a firm actively chose to participate in the CFSP. According to the CFSI (2013), a smelter on the active list has committed to follow CFSP standards and take a CFSP audit. It is also the date when a firm is added to a CFSP Active Smelters & Refiners list on the CFSI's website, after signing the Agreement on the Exchange of Confidential Information (AECI) (CFSI, 2013). Smelters on the Active Smelters & Refiners list are engaged in the program but not yet compliant.
- *Initial compliance date* is the first date for which the CFSP has concluded an eligible entity that is considered compliant with the audit protocols. For the 3Ts, a compliant smelter is a firm that has been audited and found compliant with the relevant CFSP protocol. For gold smelters, some of them are already compliant in other similar programs, such as LBMA and RJC. The initial compliance date for these gold smelters is the date when their programs are recognized by CFSP and the firm is added to the compliant smelter list.

A first idea of this study was to look at identification date as the start point and calculate the period from identification date to active date. However, this was complicated as there was few satisfactory results or clean data. Therefore, the active date and initial compliance are

adopted at last. Based on active date and initial compliance date, two dependent variables describe the time taken for a firm to participate in the CFSP: *commitment group* and *implementation period*.

5.1.1.1 Commitment Group

The *commitment group* indicates how quickly a smelter has decided to participate in the CFSP. It is based on the active date of a smelter in the dataset. The commitment group is chosen to present how a smelter reacts to being compliant with CFSP protocols and fulfills its social responsibility. During this period, the firm will be contacted by CFSP and its decision-makers finally decide to accept the CFSP protocol standards. The commitment group judges if a smelter or refiner commits to CFSP protocol earlier or later. Importantly, the groupings are defined for each metal.

Rogers (2010) produced a theory of the adoption of innovations among individuals and organizations, which revealed that the passage of time is necessary for innovations to be adopted; they are rarely adopted at the same time. He also discussed that diffusion of innovation signifies a group phenomenon, indicating how an innovation spreads (Rogers, 2010). Based on the theory proposed by Rogers, the two hundred and fifteen CFSP compliant smelters are grouped into categories of leader, follower, middle majority, or laggard, depending on when the decision-makers of a smelter commit to following protocol standards according to the CFSP. Leaders are smelters that adopt the CFSP at the earliest. The followers are smelters just following early adopters; they are thoughtful when deciding whether to accept CFSP standards. Middle majority are smelters that commit to the CFSP protocol standards only when participating in the CFSP becomes main stream. The laggards refer to the smelters that only accept the CFSP protocols after the conflict-free sourcing has been adopted by most smelters and they are late adopters. Specifically, smelters and refiners for each of the metals are grouped in the following figures, and the red lines are used to mark the commitment group (Figure 3, Figure 4, Figure 5 and Figure 6).

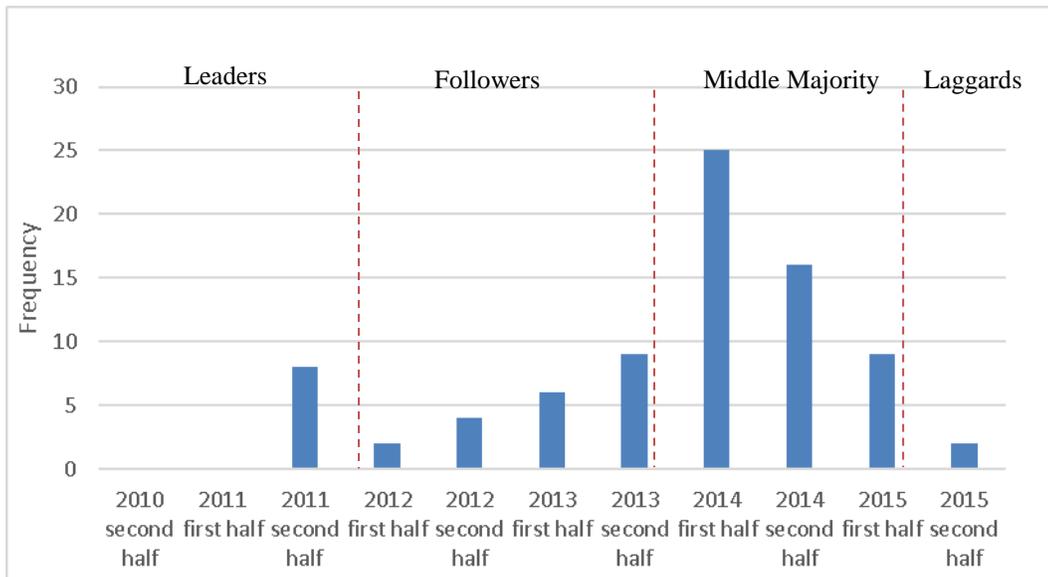


Figure 3. Active Dates of Gold Smelters and Refiners (n=81)

Figure 3 displays the commitment group of the gold smelters and refiners. The initial protocol publish date for gold was 2011/09/11 (CFSI, 2013). There is a set of gold smelters and refiners becoming active in 2011. Of all the seven leaders, there are six smelters from developed countries while there is only one from a developing country. As they are the earliest CFSP protocol adopters, these smelters are considered the leaders of gold. After the leaders became active a number of smelters followed, becoming active in 2012 and 2013. They are considered followers. In 2014 and in the first half of 2015, there was a large number of gold smelters that became active, which is the majority of the gold smelters. These smelters are considered as the middle majority of the total. In the second half of 2015, a small number of gold smelters became active, which are two Russian gold refiners. As they are the latest gold smelters to become active, they are considered the laggards. The dataset suggests that some gold smelters are not in the CFSP originally, but they have already become compliant smelters of other programs (LBMA, RJC) before the CFSP recognized these programs (Appendix B). These gold smelters are the quickest CFSP adopters because they have already passed a third party audit.

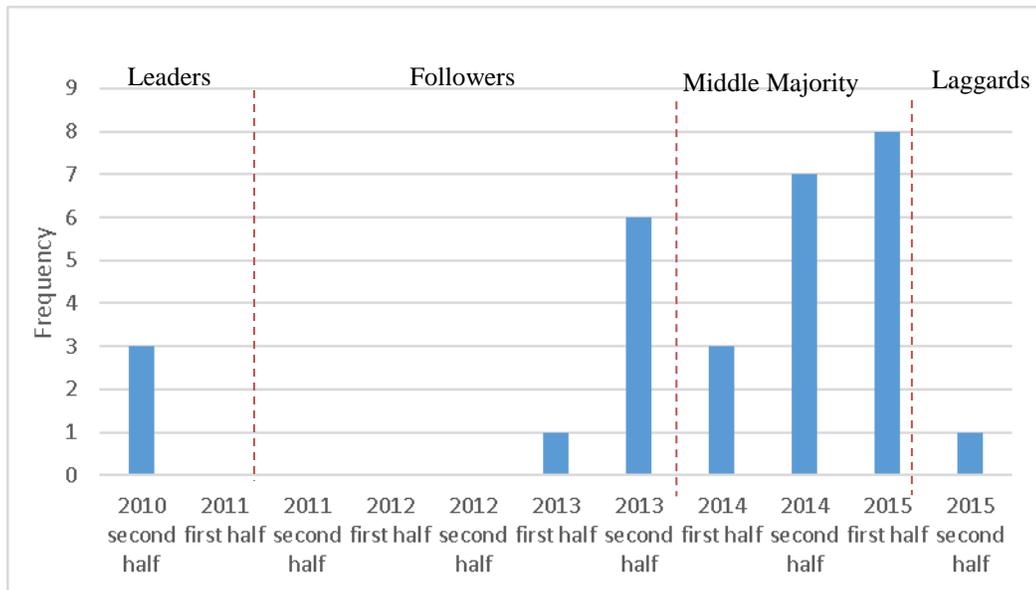


Figure 4. Active Date of Tungsten Smelters and Refiners (n=29)

Figure 4 displays the commitment group of tungsten smelters and refiners. The initial protocol publish date for tungsten is 2011/08/09 (CFSI, 2013). In the second half of 2010, there were three tungsten smelters that became active, which are the earliest of them all. These smelters are considered the leaders of tungsten smelters. The three tungsten leaders are all owned by HC. Starck Group. Two years after the leaders became active, a set of tungsten smelters that followed the leaders in 2013. These smelters are considered the followers of the tungsten leaders. In 2014 and the first half of 2015, a large number of tungsten smelters became active, which is the majority of tungsten smelters. Thus, they are considered the middle majority. There are more Chinese tungsten smelters than non-Chinese smelters among followers and middle majority. In the second half of 2015, there was only one smelter, Niagara Refining LLC, that became active, which was the most recent tungsten smelters. Therefore, it is listed as the laggard of tungsten.

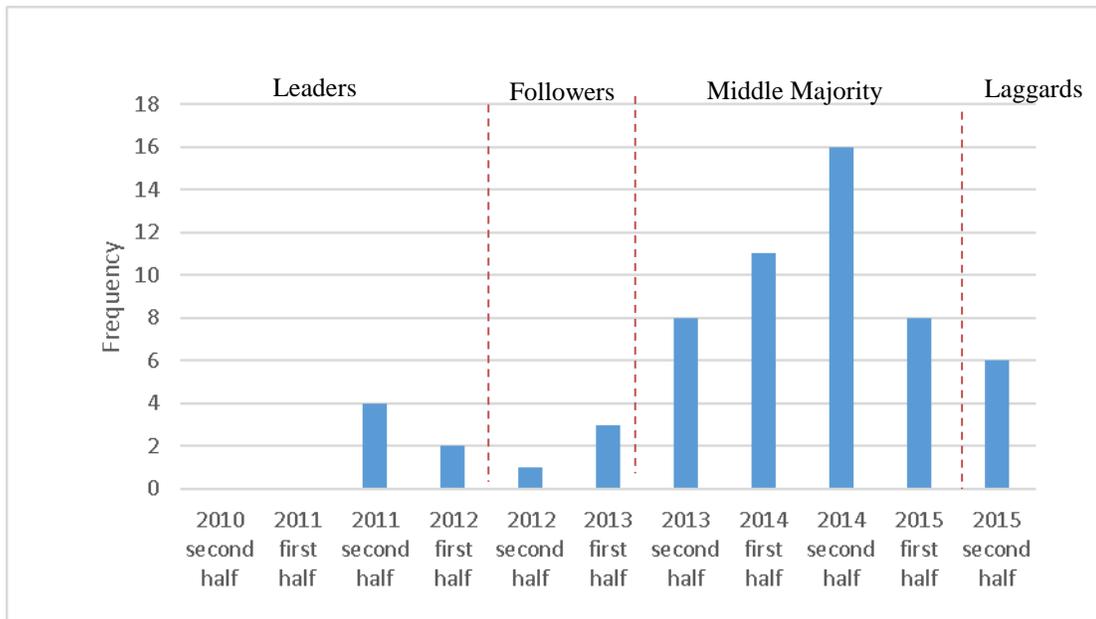


Figure 5. Active Date of Tin Smelters and Refiners (n=59)

Figure 5 displays the commitment group of tin smelters and refiners. The initial protocol publish date for tin was 2011/09/15 (CFISI, 2013). In the second half of 2011 and the first half of 2012, a small group of tin smelters became active. They are considered the leaders, as they are the earliest of all tin smelters. Although most tin smelters are from Indonesia, all leaders are non-Indonesia smelters. In the second half of 2012 and the first half of 2013, a tiny group of smelters followed the leaders. They are considered the followers of the tin leaders. From the second half of 2013 to the first half of 2015, a large number of smelters became active, and are considered the middle majority. There are more Indonesia smelters than non-Indonesian smelters among the followers and middle majority. In the second half of 2015, six smelters became active, which are the most recent tin smelters. All these smelters are private firms from Indonesia and are considered the laggards of tin.

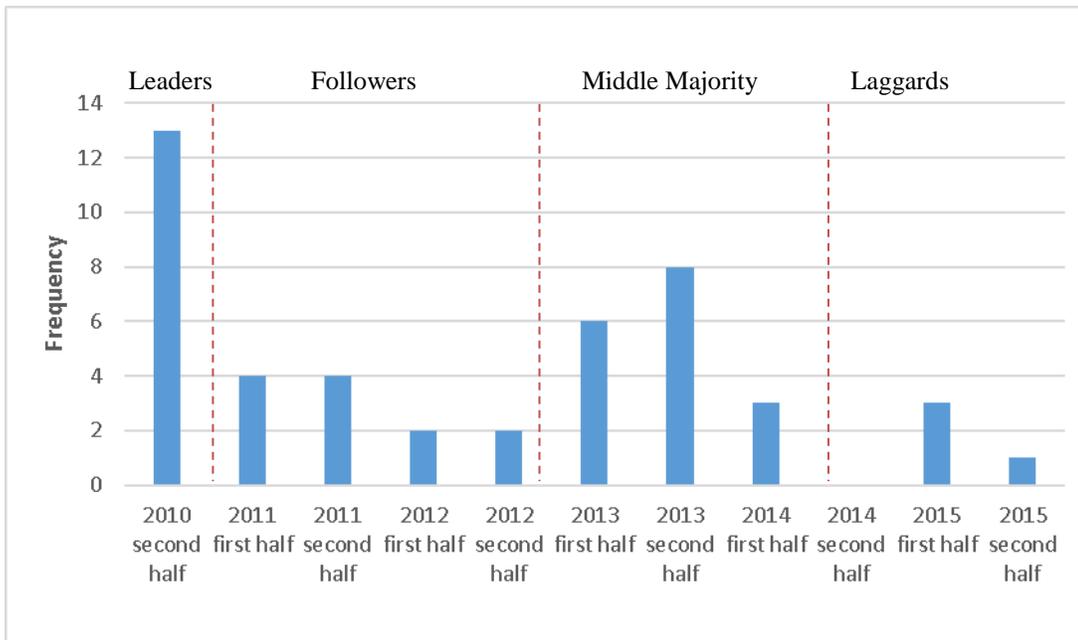


Figure 6. Active Date of Tantalum Smelters and Refiners (n=46)

Figure 6 displays the commitment group of the tantalum smelters and refiners. The initial protocol publication date for tantalum was 2011/01/15 (CFSP, 2013). In the second half of 2010, a large group of smelters became active, which are the earliest and are considered the leaders in tantalum. Among the leaders, there are six smelters owned by HC Starck, and two smelters owned by Global Advanced Metals. From 2011 to 2012, another group of smelters followed the leaders; they are identified as the followers because they became active after the leaders. Most of these followers are from developed countries. From 2013 to 2014, a group of smelters became active after the followers and are considered the middle majority; most of them are from China and several smelters are from the US. In 2015, four smelters became active after most smelters, including two from China, one from Brazil and one from the US. These smelters are considered the laggards as they are the most recent tantalum smelters to become active in the CFSP.

5.1.1.2 Implementation Period

Implementation period refers to the duration from active date to initial compliance date (Figure 2). The duration of the implementation period is chosen to present how long a smelter or refiner implements the standards within the CFSP protocol that it has committed to adopt. If the length of implementation period is short, it means that a smelter or refiner quickly implemented the necessary CFSP systems and practices to follow the standards, so that no audits are of fixed length to review. This smelter is considered a quick CFSP implementer, and thus, has a better CSR implementation because it takes the firm less time to adopt relevant practices to follow the standards.

In the dataset, some gold smelters and refiners are not in the CFSP originally, but they have previously become compliant in other responsible sourcing initiatives (LBMA, RJC) before the CFSP recognized them (Appendix B). In this situation, the active dates of these gold smelters are recorded as same as initial compliance dates by the CFSP. In this study, the implementation period of these gold smelters is recorded as one day in the database (Appendix B). The reason is that these gold smelters are the quickest CFSP adopters of all, as they have already passed a third-party audit in their gold responsible sourcing initiatives.

5.1.2 Independent Variables

There are four independent variables listed in this study to measure the correlation with the commitment group and the implementation period: firm location, firm ownership, MS experience, and firm size. In this section, the measurement of each independent variable and the rationale for choosing are described in detail.

5.1.2.1 Firm Location

The country in which a firm is based is evaluated in this study. Firms are classified as being from developing countries or developed countries. According to the UNDP (2015), developed countries are countries that have a Human Development Index (HDI) of higher than or equal to 0.8, while the HDI of a developing country is under 0.8 (UNDP, 2015). The reason for

choosing the UNDP's classification is that the HDI is a composite index including life expectancy, education, and income per capita indicators, thus HDI provides a measure that is relatively objective and comprehensive, rather than the GDP (UNDP, 2015). A country scores a higher HDI when the life expectancy at birth is longer, the education period is longer, and the income per capita is higher. As mentioned by some scholars (UNDESA, 2007; Dobers & Halme, 2009), location, whether in developed or developing countries is a significant factor that may impact a firm's CSR adoption because the regulation and market systems in a developed or developing country can push the firm to pursue CSR activities or not.

Among 3TG smelters, most of them have a single facility at an operating location, which is assumed to be their management location. However, some smelters have more than one facility or operate under a business group, such as HC Starck and Xiamen Tungsten Co. In these cases, the firm location is identified as the country location of the headquarters of the business group. The reason is that as a business group, the firm headquarter is the decision-maker that chooses to participate in the CFSP for its different facilities, and its facilities should follow the orders from their headquarters. This is a fundamental issue that needs to be noted when recording the location of different smelters.

When searching for a smelter's country location, the locations of corporate headquarters are adopted as the firm location of the smelters and refiners. Therefore, it is necessary to figure out the difference between the facility location and the headquarter location, in case that the facility location instead of its headquarter location is adopted incorrectly, which is a potential risk.

5.1.2.2 Firm Ownership

Firm ownership in this study is categorized as private, publicly traded, and state-owned firms, as they have different levels in their structures. In the current literatures, firm ownership plays a significant role in deciding a firm's CSR behaviour. Based on the literature (Claessens et al. 2000; UNDESA, 2007; Choi et al., 2011), the concentration of the ownership structure impacts a firm's CSR adoption; firms with a more dispersed ownership structure have a better

CSR adoption than firms with more concentrated ownership structure because they face more pressures from stakeholders.

- A *private firm* is owned either by non-governmental organizations, by a small number of shareholders, or by company members who do not offer or trade its company stock to the general public on the market exchanges (Jermakowicz& Gornik-Tomaszewski, 2006). In the case of 3TG smelters, it is considered that many of the firms are small privately owned companies that appear to owner managed. Some are a part of a family business or owned by a small business-person, especially some Indonesian tin smelters in the dataset (Appendix A).
- A *publicly traded firm* also called a publicly held company or a public corporation is defined as a “corporation whose ownership is dispersed among the general public in many shares of stock, which can be freely traded on the stock markets” (Jermakowicz& Gornik-Tomaszewski, 2006). The examples of publicly traded firms in the database are Kemet Corporation of the New York Stock Exchange (NYSE) and Xiamen Tungsten Co. of the Shanghai Stock Exchange (SSE) in the dataset (Appendix A).
- A *state-owned enterprise* is defined as a legal entity that undertakes commercial activities on behalf of an owner government (Choi et al., 2011). In the population considered, this includes companies that may have more than ten thousand employees, such as China Minmetals Non-ferrous Metals Holding Co., Ltd. and Jiangxi Rare Metals Tungsten Holding Group Co., Ltd in the data sample. Other state-owned firms include the Malaysia Central Bank and the Canadian Royal Mint (Appendix A).

There are two other formats of ownership structures existing in the sample smelters and refiners, which are joint-venture and cooperative.

- The *joint-venture* firms are identified in the analysis; however, an attempt is made to appropriately categorize joint ventures into one of the main four categories. If the owners are all private companies, the joint-venture firm is categorized as a private firm. However, the owners of a joint-venture firm could consist of a private firm and a state-owned firm or a publicly traded firm, which is complicated. The way to categorize the ownership of joint venture firms in our study is to treat this ownership of kind of joint-venture firm as the ownership of the owner company that has the most shares of the joint-venture firm. The reason is that in a joint-venture company, the decision is dependent on the party who holds the largest portion of shares (Osland & Cavusgil, 1996); the decisions on choosing to participate in CSR initiatives are mainly related to the company who is the biggest shareholder. Therefore, the ownership of joint-venture smelters in the study will be treated as the ownership of the firm who holds the majority shares.
- Another exception is a *cooperative* firm, which is Coopermetal in the dataset. This kind of firm is owned, controlled, and operated by a group of members for their own benefit (Skurnik, 2002). In this kind of ownership structure, each member contributes equity capital, and shares in the control of the firm on the basis of one-member, one-vote, which is not based on each equity contribution (Skurnik, 2002). It is difficult to measure a cooperative firm's internal management because all the members have the right to make decision. To solve the problem, it is necessary to take a further look at the members of a cooperative corporation; if there are more members who have a similar ownership, the ownership of the cooperative firm in the dataset is recorded as the ownership of its majority members.

5.1.2.3 Management System Experience

This independent variable considers whether a firm has previous management system (MS) experience. A MS is the framework of processes that are used to ensure that an organization can fulfill all tasks required to achieve its objectives (Colianese and Nash, 2001). Whether a

firm has a management system experience is measured by the presence of formal ISO or similar certifications. In the dataset, of all two hundred and fifteen smelters, there are one hundred and eighteen having management systems.

The management systems used by smelters include: ISO 14001, ISO 9001 and OHSAS 18001. Zwetsloot's study (2013) found that the development of CSR is significantly related to the value of management system. Some scholars (Darnall et al, 2008; Darnall et al., 2006; Klassen & McLaughlin, 2001; Schmidheiny, 1992) state that firms that have adopted a management system, such as the environment management system (EMS), may their focus beyond their organizational boundaries and possess capabilities that are complementary to CSR initiatives. Thus, a firm that has prior management system experience is more likely to adapted and manage the CSR programs. Therefore, it is considered that a firm's management system experience impacts a company's participation in CFSP.

To gather information on the MS experience, ISO or similar MS certifications should be searched; however, it is uncertain whether all firms with a management system certification really display the certification on their websites or annual reports. Moreover, the weakness of this identification needs to be raised. ISO management systems or similar certified MSs are used to indicate whether a smelter has MS experience in this study. This identification has its limitation because firms are identified as having management systems according to ISO or similar management system certifications. However, the best that the study can do is to check all necessary sources to collect information of all smelters' MS certifications.

5.1.2.3 Firm Size

Definitions of firm size that are provided by many countries in the world all mention that the number of employees is a significant indicator to measure firm size (Industry Canada, 2013; Department of Business, Innovation and Skills, 2012). The definitions of firm sizes vary in different countries throughout the world. According to Industry Canada (Industry Canada, 2013), in Canada, the small, medium and large firms are divided based on the number of employees. A small firm has less than 100 employees; a medium firm has 100 to 500

employees; a large firm has more than 500 employees. European Commission defines small enterprises as having up to 50 employees; medium-sized enterprises have up to 250 employees, while large firms have more than 250 employees (European Commission, 2003). According to the definition provided by the US, the criteria for categorizing firm sizes is based on industry, ownership structure, revenue, and the number of employees (United States Small Business Administration, 2012). The US generally uses the same threshold of fewer than 10 employees for small offices (United States Small Business Administration, 2012). In Australia's definition of firm size, a small and medium-sized enterprise has 199 or fewer employees; a small business has 5 to 19 employee numbers; medium firm have 20 to 199 employees, a large firm 200 or more than 200 employees (Australian Bureau of Statistics, 2001). Therefore, there is no doubt that the categorization of firm size is based on the employee numbers according to the definitions provided by different countries. Becker-Blease, Kaen, Etebari and Baumann (2010) also state that number of employee is better than profitability in measuring firm size. The reason for using the number of employees to measure firm size is that coordination and control costs are likely to be highly correlated with both value added per employee and the number of employees (Becker-Blease et al., 2010). Therefore, the number of employees could be representative of the firm size. However, the log of the number of employees will be used in this study in order to account for the fact that the median number of employees for firms is considerably less than the mean (Becker-Blease et al., 2010) because the number of employees of the 215 samples varies from 12 to 177000.

In some cases, information on the number of employees was not available. For example, for many small Indonesian tin smelters, they do not provide the information for their employee numbers. To fill the blank of the number of employees of these smelters, the missing data were estimated based on their annual production capacity, which is a value that most firms publish. The larger a smelter's annual production volume, the more employees they will have. To fill the data gap on the number of employees of Indonesian tin smelters, the regression analysis was done to test the relationship between the number of employees and the annual production volume (Figure 7).

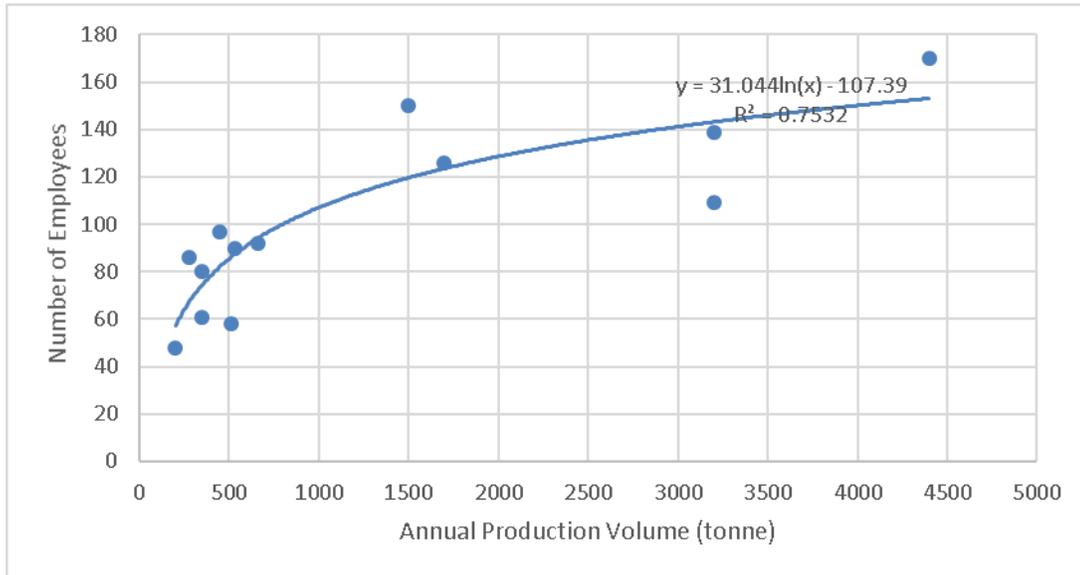


Figure 7. Number of Employees Corresponds to Production Capacity for Small Indonesian Tin Smelters

Figure 7 displays the regression relationship between the number of employees and production volume. According to Figure 7, it is obvious that there is a strong positive relationship between the number of employees and the annual production volume of Indonesia tin smelters. Therefore, the evidence supports the assumption that the production volume can reflect the number of employees of these smelters. Moreover, by using the function from the regression analysis, the missing information of number of employees of the Indonesian tin smelters can be estimated for firms for which other data were missing.

Table 2 Structure of Dependent and Independent Variables

	Construct	Indicator	Operationalization	Rationale
Dependent Variable				
Commitment Group	CSR commitment	Active Date	Coded 1=leaders, 2=followers, 3=middle majority, 4=laggards	Active Date could reflect a firm's early or late CFSP commitment
Implementation Period	CSR implementation	Difference between Active date and Initial Compliance Date	Initial Compliance Date-Active Date (measured continually in units of days)	Implementation Period could reflect a firm's slow or quick CFSP implementation
Independent Variable				
Firm Location	Developed and developing country	Developing or developed country of headquarter	Coded 0=developing countries, 1=developed countries	Headquarter is the decision maker for its facilities to choose to participate in the CFSP
Ownership	Concentrated or dispersed ownership	Private, publicly traded and state-owned	Coded 1=private, 2=publicly traded, 3=state-owned	These three ownership structures typically represent the concentrated (state-owned and private-owned) or dispersed ownership structure (publicly traded)
Management System (MS) Experience	Firm's experience on MS Adoption	ISO and similar MS certifications	Coded 0=no, 1=yes	ISO system is a certification, having an ISO or similar system certification implies that a firm has the management experience as CFSP is a type of CSR management tool
Firm Size	Firm Resources	Number of Employees	The log of number of employees	Smelters and refiners are labour intensive, thus the number of employees could indicate their sources availability

Table 2 displays the brief summaries of the construct, indicator, operationalization and rationale for choosing each dependent variable and independent variable. It describes the

information for the dependent and independent variables metrics that are discussed in Section 5.1. In addition, Table 2 provides the dummy code for some variables. The classification of information is an important step towards preparation of data for computer processing with statistical software. According to Table 2, the nominal variables of the commitment group, firm location, ownership and MS are coded in this study, to transfer the data for the commitment group, firm location, firm ownership and management system (MS) experience into the forms that can be understood by SPSS, the software used for statistical analysis. Therefore, SPSS can easily process these data. As previously mentioned, the two hundred and fifteen CFSP compliant smelters are categorized into four commitment groups based on their active date: leaders, followers, middle majority and laggards. In this study, the four groups are coded as 1, 2, 3 and 4, respectively. If the number of commitment group is larger, it means that a smelter or a refiner becomes active later. In addition, for firm location, smelters and refiners are coded as 0 (developing country) and 1 (developed country). Lastly, as these smelters have diverse backgrounds on MS experience, they are coded as 1 (MS certification), and 0 (no MS certification). Unlike the nominal variables, the implementation period is measured as a continuous variable and it is measured in days.

5.2 Data Sources

The study period of the research is from 2010 (the beginning of the CFSP) to April 2016, and the program is still ongoing as more smelters are participating, which is a constraint of this study. Data sources for dependent variables included information from four responsible sourcing initiatives, CFSI, LBMA, RJC and TI-CMC. CFSP consolidates the list. Sources of data on independent variables include company websites, annual reports and Google Finance, where the information is about the firm location, the number of employees, the firm ownership, and the MS experience.

- Currently, there are over three hundred companies from seven different industries that participate in the CFSI. The CFSI manages to a range of tools and resources including the Conflict-Free Smelter Program (CFSP), the Reasonable Country of Origin Inquiry

(RCOI) data, and a range of guidance documents on conflict minerals sourcing (CFSI, 2013). The CFSI also operates regular workshops on conflict minerals issues and assists in policy development and debates with leading civil society organizations and governments (CFSI, 2013). As the flagship program of the CFSI, the CFSP takes a unique approach to helping firms make informed choices on mineral sourcing in their supply chains. CFSP has a list of 3TG smelters that meet the standards of the audit around the world (CFSI, 2014), which is posted on its website. Information on the active date and the initial compliance date of the CFSP compliant smelters is collected from its posted website list.

- The London Bullion Market Association (LBMA) comprises and represents key players including the majority of the gold-holding central banks, private sector investors, mining companies, producers, refiners and fabricators and their clients in the bullion market, which is centered in London, England but which has an international footprint (LBMA, 2011). Information on the active date and the initial compliance date of compliant gold smelters and refiners can be sourced from the website of LBMA.
- The Responsible Jewellery Council (RJC) is a whole-of-supply chain standards initiative for the jeweler supply chain, from mine to retail (Responsible Jewellery Council, 2009). It is unique in its participation of organizations at every step in the value chain, each bringing a commitment to a responsible supply chain and implementation of responsible business (Responsible Jewellery Council, 2009). Information on the active date and initial compliance date of gold compliance smelters can be accessed on the website of RJC.
- Tungsten Industry—Conflict Minerals Council (TI-CMC) is an organization that provides a method for facilitating compliance with reasonable country of origin inquiries within the tungsten industry while protecting confidential, sensitive, and

proprietary information relating to members' supply chains of Tungsten (TI-CMC, 2016). Information on the tungsten smelters and their active dates and firm locations are provided from the website of TI-CMC.

Other sources for information on independent variables, such as the firm location, the firm ownership, the firm Size and the MS Experience, is found on the company website, annual report, and Google Finance.

- *Company Website and Annual Reports* provide the location of the company's headquarters, information about the firm ownership, employee numbers, and MS experience.
- *Google Finance* is a website launched by Google. The features of Google Finance include the stock markets, news, stock screener, and portfolios of publicly traded firms. Google Finance is a data source because it has portfolios of the publicly traded smelting firms. From Google Finance, information about the country of headquarters and the number of employees of publicly traded firms are collected in the dataset.

5.3 Data Analysis

In this study, the linear regression analysis is used to analyze the data on the smelting firms. The purpose of using regression is to estimate the relationship between the dependent variables and independent variables. It helps one understand how the typical value of the dependent variable changes when any one of the independent variables is modified. This paper considers two hundred and fifteen 3TG smelting firms which are compliant in the CFSP.

Table 3 displays the descriptive statistics of the variables, Commitment Group, Implementation Period, Firm Location, Ownership, MS Experience, Number of Employees and the log of the number of employees. Table 3 lists the minimum, maximum, mean and

standard deviation of these dependent variables and independent variables.

Table 3 Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
Commitment Group	1	4	2.58	0.804
Implementation Period	1	1,670	192	265
Firm Location	0	1	0.470	0.500
Ownership	1	3	1.38	0.613
MS Experienced	0	1	0.550	0.499
Number of Employees	12	177,000	3,430	13,500
Ln (number of employees)	2.48	12.1	6.21	1.85

The SPSS statistics software is used for the data analysis in this study. The p-value (2-tailed) of the correlation between the independent variables and the dependent variables indicates as the results. The p-value for the independent variable explains whether the independent variable has a statistically significant predictive capability. If the p-value is less than 0.05, it means that the result is over a 95% significance level, which indicates that the independent variable has a strong relationship with the dependent variable.

The coefficient between the independent variable and the dependent variable also indicates the results. If the coefficient is positive, the independent variable has a positive impact on the dependent variable; if coefficient is negative, the independent variable has a negative effect on the dependent variable.

Chapter 6 Results

This chapter presents the findings obtained from the linear regression analysis of the two hundred and fifteen CFSP compliant firms. The results on both the commitment group and the implementation period are described in this chapter. The significance value (p-value) and coefficients are used to interpret the results.

Table 4 displays the correlations between the two dependent variables, the commitment group and the implementation period. The results illustrate that commitment group has a strong negative relationship with the implementation period (coefficient=-0.252, $p<0.01$). It means that later adopters are more likely to use less time to implement CFSP the audit protocol practices than earlier adopters.

Table 4. Regression Results on Dependent Variables

	Implementation Period	
Commitment Group	Coefficient	-0.252**
	p-value	$p<0.01$

** . Correlation is significant at the 0.01 level (2-tailed), $p<0.01$

* . Correlation is significant at the 0.05 level (2-tailed), $p< 0.05$

As a test, the study did run statistics on each of the four groups of metals separately. However, the results did not differ significantly from the aggregated results, and the statistics are stronger when aggregated because there are more sample numbers in those runs. Therefore, the decision was made to keep 3TG all together in the results.

6.1 Commitment Group

Table 5 displays the correlations between the independent variables and the commitment group. From Table 5, the commitment Group has a strong relationship with the firm location, as the correlation is at the 0.01 level ($p<0.01$). In addition, as the coefficient is negative

(coefficient= -0.235), firm location has a negative effect on the commitment group, which means that the smelters in developed countries are more likely to be active earlier than those in developing countries. Therefore, the results on firm location provide support for Hypothesis 1a and 1b.

Table 5. Regression Results on Independent Variables

Dependent Variable		Commitment Group	Implementation Period
Independent Variable			
Firm Location	Coefficient	-0.235**	-0.088
	p- value	p<0.01	0.197
Firm Ownership	Coefficient	-0.111	-0.121
	p- value	0.105	0.078
MS Experience	Coefficient	-0.303**	0.010
	p- value	p<0.01	0.888
Firm Size	Coefficient	-0.258**	0.082
	p-value	p<0.01	0.232

**, Correlation is significant at the 0.01 level (2-tailed), p<0.01

*, Correlation is significant at the 0.05 level (2-tailed), p<0.05

For the correlation between the firm ownership and commitment group, the results show that the commitment group does not have a relationship with firm ownership, as the correlation is insignificant ($p>0.05$). Therefore, the results fail to provide support for Hypothesis 2a and 2b.

The results also show that the commitment group has a strong relationship with a firm's MS experience, as the correlation is significant at the 0.01 level ($p<0.01$). In addition, the MS experience also has a negative effect on the commitment group (coefficient= -0.303), which

means that firms with MS experience commit to the CFSP protocol standards earlier than those without MS experience. Therefore, the results provide support for Hypothesis 3a and 3b.

According to Table 5, the results indicate that the firm size has a strong relationship with the commitment group as the correlation is significant at the 0.01 level ($p=0.232$). Besides, firm size has a negative effect on Commitment Group (coefficient= -0.258), which means that larger firms are more likely to commit to the CFSP standards earlier than smaller firms. Therefore, the results provide support for Hypothesis 4a and 4b.

6.2 Implementation Period

Table 2 also displays the correlations between the implementation period and the independent variables of firm location, ownership, MS experience and firm size. According to the results in Table 5, firm location does not have a relationship with the implementation period because it has less than a 95% significance level ($p=0.197$). The results in Table 2 indicates that firm ownership structure does not have a relationship with the implementation period because it has less than a 95% significance level ($p=0.078$). The results also show that a firm's MS experience does not have a relationship with the implementation period because it has less than a 95% significance level ($p=0.888$). The results show that the firm size does not have a relationship with the implementation period because it has less than a 95% significance level ($p>0.05$). Therefore, the results on the correlation between the implementation period and the independent variables fail to provide support for Hypothesis 1a, 1b, 2a, 2b, 3a, 3b, 4a and 4b.

Chapter 7 Discussion

In this chapter, a number of insights are drawn based on the results from the correlation between the dependent variables and the independent variables, discussion, implications for theories and practices, and contribution to the literatures are presented in this chapter. In addition, limitations of the study are described.

7.1 Commitment and Firm Characteristics

7.1.1 Developing Countries vs. Developed Countries

Based on the results, firms from developed countries have a higher level of commitment to corporate social performance than firms from developing countries. This result aligns with the finding of previous scholars. Dobers and Halme (2009) state that CSR practices are largely framed in rich countries. CSR in developing countries is still far behind developed countries (UNDESA, 2007). Sustainability in SCM is still relatively novel and considered an innovation in developing countries, such as China (Zhu et al., 2012). The concept of CSR evolved from practices and expectations in developed countries, so that firms are more likely to be familiar with how to participate in CSR initiatives. For the CFSP most early adopters are from developed countries (Appendix A). As Wood (1991) states, corporate social performance constitutes the outcome of social performance of a firm's participation in CSR initiatives, in general, the results on the relationship between firm location and commitment in corporate social performance provide support for the findings of previous scholars

7.1.2 Dispersed Ownership Structure vs. Concentrated Ownership Structure

Based on the results, firm ownership does not have a strong relationship with a firm's commitment to corporate social performance. The result is not consistent with the findings of previous scholars that if the ownership structure of a firm is more dispersed, it is more likely to have a higher level of CSR than a firm with more concentrated ownership structure (Keim, 1978; Ullmann, 1985; Oh, Chang & Martynov, 2011).

A possible reason is that the sample of firms may not be typical of what have been considered previously. As stated in Chapter 5, the ownership structures are categorized as private, publicly traded and state-owned. However, among the samples, the same ownership structure may be different in various countries, which can affect the CSR initiatives adoption. In the dataset, there are quite a number of tiny Indonesian tin smelters. These firms are totally controlled by a family, including all decision-making. Therefore, as the data sample does not perfectly match what is expected, the bias exists as this part of the sample and may skew the results.

7.1.3 MS Experience vs. No-MS Experience

For management system (MS) experience, the results indicate that firms with prior MS experience have higher level of commitment in corporate social performance than those without MS experience. The results are in conjunction with the findings of previous scholars. Based on the literature, a MS has a significant relationship with a firm's CSR, which is mentioned in the study of Darnall et al (2008) that concludes that environmental management system (EMS) adopters may have a greater propensity to expand their focus beyond their organizational boundaries and utilize sustainable practices to minimize environmental impacts in supply chain management; the study of Darnall (2006) states that EMS may encourage some organizations to expand their environmental consideration beyond their internal operations to their suppliers and customers. Moreover, firms with MS usually have more resources to adopt CSR initiatives (Darnall et al., 2008). As corporate social performance constitutes the social performance of a firm's participation in CSR initiatives (Wood, 1991), the results on MS experience and commitment in corporate social performance correlate with the findings of previous scholars.

7.1.4 Larger Firms vs. Smaller Firms

For the firm size, the results indicate that larger firms have higher level of commitment in corporate social performance than smaller firms, which are consistent with the findings of previous scholars on Resource-based View (RBV) by Barney (1991) and Edwards et al. (2007). Barney argues that larger firms often have more financial resources and capabilities to cope with environmental issues. Edwards et al. identify that large firms are more likely to adopt CSR codes, as they face two main sources of driving forces, the legitimation and the capacity of trade unions and pressures from NGOs. These findings also correspond with the study by Bianchi and Noci (1998) which state that compared to larger firms, smaller firms are less likely to invest in environmental and other sustainability practices that have long run strategic benefits, as smaller firms have resources (labour, time, and costs) are more constrained. Therefore, as corporate social performance constitutes the social performance of a firm's participation in CSR initiatives (Wood, 1991), larger firms have a higher level of commitment in corporate social performance than smaller firms, as they have more resources to adopt sustainability practices in CSR initiatives.

7.2 Implementation and Firm Characteristics

After commitment, implementation is another significant step for firms in their social performance. The results imply that early adopters of conflict-free sourcing are likely to use more time to implement CFSP standards than late early adopters. However, the results indicate that none of the independent variables (firm location, ownership structure, MS experience or firm size) have a significant relationship with implementation.

First, the results indicate that the implementation of a firm is not significantly related to whether the firm is from a developing or developed country, which is not consistent with the findings of previous scholars that CSR adoption is related to a firm's country location. Second, the results do not provide support for the findings of previous scholar that firms with more dispersed ownership structures are more likely to implement CSR practices (Keim, 1978; Ullmann, 1985; Oh, Chang & Martynov, 2011). Third, the results indicate that a firm's MS experience does not have a strong relationship with its implementation performance, which is

different from the previous scholars who stated that firms with a MS have more capacity to implement CSR practices than those without MS experience (Darnall et al., 2008; Darnall, 2006). Last, it is surprising that the results indicate that firm size does not have a relationship with CSR implementation, which is different from the studies of previous scholars that found larger firms have more resources to implement sustainability practices (Barney, 1991; Bianchi & Noci, 1998; Branco & Rodrigues, 2006).

7.2.1 Management Capacity

There are some key discussions and findings required to explain the results of implementation. To clarify the reasons for the different results on the commitment group and the implementation period, it is necessary to explore the differences between these two dependent variables more deeply.

In Chapter 5, a firm's social performance was divided into two aspects: the commitment and the implementation. The commitment group was used to measure a firm's commitment performance, which is linked mostly with how a firm reacts to improving corporate social performance. However, the variables that are strongly related with the commitment group may not be associated with the implementation period, as the commitment group is representative on a firm's reaction to improving social performance, while the implementation period is representative of a firm's internal management capacity. The results indicate that firm location, MS experience and firm size have strong relationships with the commitment. Rather than a firm's reaction to improving social performance, the internal management capacity refers to a firm's management capability, including making policies, training employees, and maintaining supplier relationships. First, implementing CFSP standards requires firms to make policies to regulate the sourcing behaviours and to address conflict issues. Second, firms are also required to train employees, so that the employees can be familiar with the policies and the practices of the firms. Recordkeeping is also significant, as firms need to prepare relevant documents that are required for audit and to submit to a third-party audit; if the document cannot be prepared well, the audit will be delayed or even failed. The purposes of these actions is for each firm to have a robust management system that is auditable. If the manage system of a firm is not

auditable, the firm needs to take corrective actions to adjust its practices to follow the CFSP standards. Therefore, the results on implementation is different from those on commitment because what they represent in corporate social performance are not the same.

7.3 Implications for Practice

The purpose of the CFSP is to manage social issues by examining practices at the chokepoint at smelters and refiners in the metal supply chain. Based on the research of this thesis, some implications emerge regarding the practice of CSR in the field.

First, this study implies that it is possible that every kind of firm can participate in CSR initiatives. In the CFSP, there were two hundred and fifteen compliant smelters by April 2016. The ultimate objective of CFSP is to involve all 3TG smelters and refiners in the world in the program, so that the global supply chain of metals can be monitored and the social issues, such as violation of human rights in conflict areas may be prevented. The list represents a mix of firms both from developed or developing countries, with or without MS experience, and that vary in size and ownership. Both the results of the thesis and from previous scholars suggest that firms from developed countries, with a larger size and established management systems commit to CFSP standards earlier than those from developing countries, smaller sized and without management systems. However, the CFSP compliant smelter list also contains firms from developing countries, without management systems and of smaller sizes. Although the results imply that these firms have a weaker performance in commitment to CFSP protocol standards than those early adopters, they finally become compliant regardless of the firm location, MS experience and firm size. The results indicate that every smelter or refiner in the world can successfully participate in this initiative. Similarly, as the CFSP is a CSR mechanism, it is possible that CSR initiatives can be expanded to be applicable for more firms.

Second, CSR initiatives could be applicable beyond the metal industry. For example, this mechanism for supply chain could be expanded to other mineral industries besides tin, tantalum, tungsten and gold, and also to other commodities, such as agriculture and energy products. Moreover, CSR initiatives could be applied not only to manage social issues in supply chains, but also to monitor and prevent other sustainability issues happening in supply

chains, environmental pollution and over consumption of resources. For example, the OECD continues to place efforts on promoting sustainable consumption in OECD countries, addressing the environmental and social characteristics of the products (OECD, 2008). The OECD emphasizes the significance of voluntary labelling, which can help promote sustainable consumption through raising issues of reliable certification and verification so as to provide transparent information on sustainable and social characteristics of products to consumers (OECD, 2008). Therefore, the OECD's effort indicates that it is possible that sourcing transparency in sustainable consumption could be a trend to be expanded through certification as a feasible sustainability management tool.

The third implication for practice could be a strategic recommendation to industry that firm commitment is key in CSR initiatives. The results illustrate that commitment has significant relationship with firm location, MS and firm size, but implementation period has no relationship with any of the independent variables. Based on the results, commitment is a more significant step in adopting CSR than implementation. Getting firms to commit is the important step because once committed all types and sizes eventually comply. Therefore, from this study, it is recommended that the CSR initiatives can focus more on firms' commitment when when trying to engage participants.

7.4 Implications for Theory

Based on the results and the work of previous scholars on the Institutional Theory and Stakeholder Theory, the legislative force and market force are two major drivers that push the smelters and refiners to participate in CSR initiatives.

7.4.1 Legislative Force

According to Institutional Theory, regulatory pressure can impel firms to go beyond pursuing sustainability practices, so that the firms will fulfill their social responsibilities (Clappison, 2012; Minoja & Zollo 2012; Hallbäck, 2012). Most of the early CFSP standards adopters are located in developed countries, where legislation strongly influences their behaviour with a complete conflict-free sourcing-related legislation system. Legislation is a

major force that pushes firms in developed countries to adopt conflict-free sourcing. The US is the leader in regulating a firm's social responsibility in conflict mineral sourcing. The US legislation, the Dodd-Frank Section 1502, provides strong legislative framework that forces firms to monitor their sourcing, especially from conflict areas. This US effort has been the largest force which contributing to the development of responsible sourcing initiatives. Because of the efforts of the US government on conflict-free sourcing, OEMs and smelters in the US have to follow the regulations of Dodd-Frank Section 1502. Because the regulation requires the firms to disclose and report whether their products contain minerals associated with conflicts in DRC or adjoining countries. In the commitment groups, early adopters are mainly from developed countries (Appendix A). Smelters and refiners in the US are directly facing the pressure from Dodd-Frank Section 1502. For firms from developed countries other than the US, such as Europe, they follow their peers in the US. Therefore, according to the CFSP participation, CSR initiatives are headed by developed countries, and legislation is a significant driver that contributes to the movement of CSR initiatives.

7.4.2 Market Force

Based on the results of the research by previous scholars and the results on Institutional Theory (Dobers & Halme., 2009; UNDESA, 2007; Zhu et al., 2012), firms from developing countries face lower expectations from legislation or voluntary CSR compared to firms from developed countries. However, in CFSP, these firms finally exist on the compliant smelter list, which proves that CSR initiatives have emerged among all smelters with different backgrounds, as all of them have participated in the CFSP. For example, Chinese firms have done well in getting into CFSP.

Based on the Institutional Theory, market pressure from downstream customers could be a driving force for sustainability (Zhu & Sarkis, 2007). Similarly, according to Stakeholder Theory, a stakeholder concern can be a driving force to push a firm to adopt sustainability practices including social responsibility, and these concerns could be from its customers who are important stakeholders (Ball & Craig, 2010). Market forces could be a potentially strong force to pull these firms to engage in the CFSP. Smelters from countries other than the US may

not have the legislative pressure from Dodd-Frank Section 1502 directly. However, they have pressures from the market. The global metal supply chain has as deep as eight links (see Figure 1). Market forces penetrate the supply chain. First, market forces can reach suppliers and traders all over the world, as the supply chain has been expanded with globalization; second, it also can penetrate deep into the supplier network where eventually the market force reaches smelters and refiners in remote areas of the world, which is why they participate in the CFSP. This market pressure prompts these smelters and refiners to become CFSP compliant smelters, as they need to maintain their relationship with buyers and do not want to lose access to their markets.

7.5 Contribution to Literatures

To sum up, this study has provided support for the findings of previous studies that the Institutional Theory, Stakeholder Theory and Resource-Based View are strongly associated with firms' participation in CSR initiatives. The legislative force and market force from the study of the CFSP participation are correspondent with the literatures on Institutional Theory and Stakeholder Theory. Literature on Institutional Theory mentioned that legislative pressure can push a number of firms to adopt CSR initiatives. In the CFSP, Dodd-Frank Section 1502 can affect the OEMs and smelters from the US, but cannot reach all smelters. The market force is the main direct pressure that can widely involve firm with different background in CSR initiatives. Both the Institutional Theory and Stakeholder Theory mentioned that market pressure from downstream customers is a significant driver. In the CFSP, smelters from countries other than the US are not affected by regulations directly, but they may face the market force from their customers. To maintain the relationship with customers and to keep their business, these firms have to follow the requirements from the buyers. The literature on Resource-Based View mentioned that that internal resources of large firms have the capability to implement CSR practices; however, this study illustrated that small firms can also implement CSR practices, as markets reward small businesses with sufficient resources to support the costs of taking part in CSR initiatives.

In addition, this study provides important findings on the current research about SCM. Current research regarding SCM focuses more on environmental issues, and very few studies

focus on social issues. This research gap needs to be identified. This study proves that social issues in the supply chain are being noticed. In the metal industry, firms have begun to pay attention to social problems that happen in supply chains and some have participated in CSR initiatives such as the CFSP. Moreover, this study provides the findings that whether a firm makes a commitment to improving corporate social performance does not matter much to its firm location, MS or size. In this study, that regardless of the firm location, MS and firm size, firms can still improve their social performance by participating in the CFSP.

7.6 Limitations

In this study, the sample representation and the metrics of the variables are two main limitations that may have had a negative effect on the validity of the results.

7.6.1 Sample Representation

The major constraint of the study is whether the smelters and refiners on which data are collected is a representative sample. For example, the tungsten industry still has quite a number of smelters that are not active, or at least not compliant, and therefore not present in the sample population of two hundred and fifteen. For tin there are still a set of smelters and refiners being identified and that will be participating. For gold, the list is very open-ended, and there may be hundreds of facilities that have not been engaged in any way. As more smelters and refiners are coming into the CFSP, the sample should be elaborated. What is more, there is an uncertainty that the number of future CFSP participants is unpredictable, as there is quite a number of smelters being identified or coming into the program. The constraint of the sample representation may become a limitation on the commitment group. With the passage of the time, more smelters and refiners will participate in the CFSP. The distribution of the commitment group, may not meet the diffusion of innovation theory by Rogers. The middle majority or the laggards in the current commitment group could be early adopters in the future. Besides, this study excluded potential firms that could have been included that are active in or identified by CFSP, which could have provided a larger sample size.

Thus, in future research, the dataset should be updated as more firms are going to

participate in the CFSP. At the very least, it is necessary to look into the most recent lists and to discover if additional facilities are being added, as an indication as to whether the rest eligible smelters are still joining the list. What is more, the dataset could add the active smelters that have not been compliant to enlarge the sample size.

7.6.2 Metrics of Independent and Dependent Variables

For ownership, the decision making on CSR adoption in joint-ventures firms could be further investigated. In this study, the shareholders who own the most shares are considered to have the power to make the final decisions in a firm's management, including CSR relevant practices. However, the real situation could be more complicated. In some developing countries, governments play a more significant role in market operation and administration than in developed countries such as China. In some joint-venture firms containing national capital, the government may have more decision-making power than shareholders. Moreover, the personal view of the manager is ignored in this study. A manager's acceptance on CSR could affect whether a firm adopt CSR initiatives or not. A traditional manager could be a laggard in adopting CSR initiatives, while a new generational manager could be braver to adopt CSR initiatives earlier than others. In future research, more factors should be considered when examining ownership structure in the field of CSR.

For the MS experience, the presence of ISO or similar MS certifications is adopted to represent whether a firm has MS experience. However, a limitation exists on using ISO certification to measure the MS experience of the two hundred and fifteen CFSP compliant smelters. First, ISO certification may not be advertised, which is difficult to ensure that all firms owning ISO certification could be confirmed. Second, the MS experience could be presented without the visibility of an ISO or similar MS certification. Therefore, the prevalence of this measure was likely underestimated. In some cases, the MS experience could be obtained from examining daily operations, not just from a ISO or similar MS certifications. This kind of MS experience without an ISO or similar MS certification is difficult to measure. Therefore, in future research, more accurate measurement of the MS experience of a firm should be identified.

The number of employees is selected in this study to measure firm size. It was argued, for example, that tin smelters are labour intensive businesses and the number of employees can reflect the firm size. However, it may not accurately evaluate the firm size for capital intensive or technologically intensive firms. In addition, other size characteristic factors, such as market capitalization, total sales, export sales volume, and percentage of sales as exports need to be investigated. Future research in this area could be expanded in other industries, which are not labour intensive, could utilize the indicators of revenue or total assets as a way to measure the firm size and should be integrated into future research. Given the spectrum of sizes of firms considered (from 12 to over 177,000 employees) the limitation of this metric is likely low.

For the implementation period, gold smelters and refiners that have already participated in gold programs, such as RJC and LBMA, thereby their Implementation Period is recorded as one day in section 5.1.1.2. The reason is that they are quick implementer of conflict-free sourcing because they have already engaged in conflict mineral sourcing. However, the time for such a firm to implement LBMA or RJC standards would not be one day. It is possible that the real time for implementation in their gold initiatives is more than one day. In this case, the implementation period of these smelters cannot accurately represent how long it takes them to implement the conflict-free sourcing policies and management systems. Therefore, in the future research, it is necessary to collect the information on the actual implementation period of these gold smelters that can objectively reflect their ability to execute conflict mineral sourcing policies and management systems.

Another limitation for implementation period is based on the results in Chapter 6. The results on the relationship between commitment group and implementation period illustrate that some leaders become active before the initial protocols of the CFSP are published; therefore, as the audit protocols have not been published, it is difficult for these leaders to follow complete protocol standards and their implementation is delayed. However, after the protocols are published, the complete standards are established for more smelters to follow. Therefore, the late participants use less time than smelters who have committed before the complete audit protocols are published, which cannot accurately represent the implementation of some firms.

Chapter 8 Conclusions

This study provides new insight into how a firm can deal with their CSR by using the indicator of its CFSP participation where there is a high expectation for firms to behave in a CSR manner. The broad concept from this study is based on many trends that appear in the individual analyses of the data. The results in the thesis report that (1) the country location is associated with a firm's social performance, and firms from developed countries adopt CSR standards earlier than those from developing countries; (2) the management system (MS) experience is associated with a firm's social performance, and firms with MS experience adopt CSR standards earlier than those without MS experience; (3) the firm size, especially the number of employees, is associated with a firm's social performance in labour intensive business, and larger firms adopt CSR standards earlier than smaller firms. However, the results indicate that firm ownership does not have significant relationship with CSR adoption; in addition, the results show that these independent variables do not have a significant relationship with CSR implementation, because implementation is linked more with a firm's management capability than its social responsibility performance. Based on the results, it is concluded that a legislative force and market force are two main drivers that push a firm to adopt CSR initiatives. In this study, the systematic review of the literatures, coupled with the experiences and perspectives from the data analysis on two hundred and fifteen CFSP compliant smelters and refiners help highlight and guide future meaningful research in this area of CSR.

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Appendix A Tantalum Facilities

Smelter	Firm Location	Ownership	MS	Size
Changsha South Tantalum Niobium Co. Ltd.	CHINA	Private	1	200
Conghua Tantalum and Niobium Smeltry	CHINA	State-owned	1	300
D Block Metals, LLC.	UNITED STATES	Private	0	150
Duoluoshan	CHINA	Private	1	600
Exotech Inc.	UNITED STATES	Private	0	60
F&X Electro-Materials Limited	CHINA	Private	1	130
FIR Metal & Resources Ltd.	CHINA	Private	0	50
Global Advanced Metals	AUSTRIA	Private	1	6000
Global Advanced Metals	AUSTRIA	Private	1	3000
Guangdong Zhiyuan New Material Co. Ltd.	CHINA	Publicly traded	1	1000
Guizhou Zhenhua Xinyun Technology	CHINA	State-owned	0	200
H.C. Starck - Hermsdorf GmbH	GERMANY	Private	1	103
H.C. Starck Co. Ltd. - Thailand	GERMANY	Private	1	235
H.C. Starck GmbH - Goslar	GERMANY	Private	1	980
H.C. Starck GmbH - Laufenburg #1	GERMANY	Private	1	163
H.C. Starck Inc. - Newton	GERMANY	Private	1	454
H.C. Starck Ltd. – Mito	GERMANY	Private	1	72
H.C. Starck Smelting GmbH & Co. KG - Laufenberg #2	GERMANY	Private	1	164
Hengyang King Xing Lifeng New Materials Co. Ltd.	CHINA	Private	1	70
Hi-Temp Specialty Metals, Inc.	UNITED STATES	Private	0	200

Smelter	Firm Location	Ownership	MS	Size
Jiangxi Dinghai Tantalum & Niobium Co., Ltd	CHINA	Private	1	100
JiuJiang JinXin Nonferrous Metals Co. Ltd.	CHINA	Private	1	100
JiuJiang Tanbre Co. Ltd.	CHINA	State-owned	1	600
Jiujiang Zhongao Tantalum & Niobium Co., Ltd	CHINA	Private	1	180
Kemet Blue Metals	UNITED STATES	Publicly traded	1	9300
Kemet Blue Powder	UNITED STATES	Publicly traded	1	9300
King-Tan Tantalum Industry Ltd.	CHINA	Private	1	200
LSM Brasil S.A.	BRAZIL	Private	1	375
Metallurgical Products India Pvt. Ltd. (MPIL)	UNITED STATES	Private	0	60
Mineracao Taboca S.A.	PERU	Private	1	750
Mitsui Mining & Smelting	JAPAN	publicly traded	1	1802
Molycorp Silmet A.S.	UNITED STATES	Private	1	2400
Ningxia Orient Tantalum Industry Co. Ltd.	CHINA	Publicly traded	1	2419
Plansee SE Liezen	AUSTRIA	Private	1	6000
Plansee SE Reutte	AUSTRIA	Private	1	6000
QuantumClean	UNITED STATES	Private	1	100
Resind Indústria e Comércio Ltda	BRAZIL	Private	0	60
RFH Tantalum Smeltry Co. Ltd.	CHINA	Private	1	50
Solikamsk Metal Works	RUSSIA FEDERATION	Publicly traded	1	2848
Taki Chemicals	JAPAN	Publicly traded	0	560
Telex Metals	UNITED STATES	Private	1	19

Smelter	Firm Location	Ownership	MS	Size
Tranzact, Inc.	UNITED STATES	Publicly traded	0	549
Ulba Metallurgical Plant JSC	KAZAKHSTAN	Publicly traded	1	6000
XinXing Haorong Electronic Material Co. Ltd.	CHINA	private	1	50
Yichun Jin New MaterialCo. Ltd.	CHINA	Private	0	100
Zhuzhou Cemented Carbide Group Co. Ltd.	CHINA	Publicly traded	1	9000

Note: Management System (MS): 0=Not having ISO or similar management system certifications

1= Having ISO or similar management system certifications

Size: Number of employees

Appendix B Gold Facilities

Smelter	Firm Location	Ownership	MS	Size
Aida Chemical Industries Co. Ltd.	JAPAN	Private	0	441
AllgemeineGold-und Silberscheideanstalt A.G.	GERMANY	Private	0	401
AngloGold Ashanti Corrego do Sitio Minercao	SOUTH AFRICA	Publicly traded	1	6321
Argor-Heraeus SA	SWITZERLAND	Private	0	280
Asahi Pretec Corporation	JAPAN	Publicly traded	1	1700
Asahi Refining Canada Ltd.	JAPAN	Publicly traded	1	1700
Asahi Refining USA Inc.	JAPAN	Publicly traded	1	1700
Asaka Riken Co Ltd.	JAPAN	Publicly traded	0	170
Atasay Kuyumculuk Sanayi Ve Ticaret A.S.	TURKEY	Private	0	60
Aurubis AG	GERMANY	Publicly traded	1	4700
Bangko Sentralng Pilipinas (Central Bank of the Philippines)	PHILIPPINES	State-owned	1	5050
Boliden AB	SWEDEN	Publicly traded	1	4881
C. Hafner GmbH + Co. KG	GERMANY	Private	0	200
CCR Refinery Glencore Canada Corporation	CANADA	Publicly traded	0	550
Chimet S.p.A.	ITALY	Private	1	150
Doduco	GERMANY	Private	1	1210
Dowa	JAPAN	Publicly traded	1	5941
Eco-System Recycling Co. Ltd.	JAPAN	Publicly traded	1	5941
Elemetal Refining, LLC	UNITED STATES	Private	1	225
Emirates Gold DMCC	UNITED ARAB EMIRATES	Private	1	100
Heimerle + Meule GmbH	GERMANY	Private	1	750
Heraeus Ltd. Hong Kong	GERMANY	Private	0	152
Heraeus Precious Metals GmbH & Co. KG	GERMANY	Private	1	13300

Smelter	Firm Location	Ownership	MS	Size
Ishifuku Metal Industry Co. Ltd.	JAPAN	Private	1	400
Istanbul Gold Refinery	TURKEY	Private	1	150
Japan Mint	JAPAN	Publicly traded	1	1050
Jiangxi Copper Company Ltd.	CHINA	Publicly traded	0	34000
JSC Ekaterinburg Non-Ferrous Metal Processing Plant	RUSSIAN FEDERATION	Private	0	565
JSC Uralcromed	RUSSIAN FEDERATION	Publicly traded	0	350
JX Nippon Mining & Metals Co. Ltd.	JAPAN	Private	0	2070
Kazzinc Ltd.	KAZAKHSTAN	State-owned	1	10000
Kennecott Utah Copper LLC	UNITED STATES	Private	1	2000
Kojima Chemicals Co. Ltd.	JAPAN	Private	0	168
L'azurde Company for Jewelry	SAUDI ARABIA	Private	0	500
LS-NIKKO Copper Inc.	UNITED STATES	Private	0	750
Materion	UNITED STATES	Publicly traded	1	2800
Matsuda Sangyo Co. Ltd.	JAPAN	Publicly traded	0	989
Metalor Technologies (Hong Kong) Ltd.	SWITZERLAND	Private	0	77
Metalor Technologies (Singapore) Pte. Ltd.	SWITZERLAND	Private	1	41
Metalor Technologies SA	SWITZERLAND	Private	1	1700
Metalor USA Refining Corporation	SWITZERLAND	Private	1	90
Met-Mex Penoles S.A.	MEXICO	Publicly traded	0	8967
Mitsubishi Materials Corporation	JAPAN	Publicly traded	1	23413
Mitsui Mining and Smelting Co. Ltd.	JAPAN	Private	1	2200
MMTC-PAMP India Pvt Ltd.	INDIA	Private	1	258
Moscow Special Alloys Processing Plant	RUSSIAN FEDERATION	Private	0	690
Nadir Metal Rafineri San. Ve Tic. A.Az.	TURKEY	Private	0	100
Nihon Material Co. Ltd.	JAPAN	Private	1	100
Ögussa Österreichische Gold- und Silber-Scheideanstalt GmbH	AUSTRIA	Private	0	140

Smelter	Firm Location	Ownership	MS	Size
Ohura Precious Metal Industry Co. Ltd.	JAPAN	Private	1	75
OJSC - The Gulidov Krasnoyarsk Non-Ferrous Metals P (OJSC Krastsvetmet)	RUSSIAN FEDERATION	Publicly traded	0	2763
OJSC Novosibirsk Refinery	RUSSIAN FEDERATION	Publicly traded	0	180
Prioksky Plant of Non-Ferrous Metals	RUSSIAN FEDERATION	Publicly traded	0	485
Produits Artistiques Metaux Precieux (PAMP) SA	SWITZERLAND	Private	0	220
PT Aneka Tambang (Persero) Tbk	INDONESIA	State-owned	0	200
PX Precinox SA	SWITZERLAND	Private	0	500
Rand Refinery (Pty) Ltd.	SOUTH AFRICA	Private	1	513
Republic Metals Corporation	UNITED STATES	Private	1	200
Royal Canadian Mint	CANADA	State-owned	1	1000
Schone Edelmetaal	NETHERLANDS	Private	1	18568
SEMPSA Joyeria Plateria SA	GERMANY	Private	1	250
Shandong Zhaojin Gold & Silver Refinery Co. Ltd.	CHINA	Private	0	600
Sichuan Tianze Precious Metals Co. Ltd.	CHINA	State-owned	0	1000
Singway Technology Co., Ltd.	TAIWAN	Publicly traded	1	180
SOE Shyolkovsky Factory of Secondary Precious Metals	RUSSIAN FEDERATION	Private	0	400
Solar Applied Materials Technology Corp.	TAIWAN	Publicly traded	0	1517
Sumitomo Metal Mining Co. Ltd.	JAPAN	Publicly traded	0	8766
T.C.A. S.p.A	ITALY	Private	0	100
Tanaka Kikinzoku Kogyo K.K.	JAPAN	Private	1	3600
The Refinery of Shandong Gold Mining Co. Ltd.	CHINA	Publicly traded	0	12985
Tokuriki Honten Co. Ltd.	JAPAN	Private	0	280
Umicore Brasil Ltda	BELGIUM	Publicly traded	1	14101
Umicore Precious Metals Thailand	BELGIUM	Publicly traded	1	14101
Umicore SA Business Unit Precious Metals Refining	BELGIUM	Publicly traded	1	14101
United Precious Metal Refining, Inc.	UNITED STATES	Private	0	75

Smelter	Firm Location	Ownership	MS	Size
Valcambi S.A.	SWITZERLAND	Private	1	177
Western Australian Mint trading as The Perth Mint	AUSTRALIA	State-owned	0	100
Yamamoto Precious Metal CO. LTD.	JAPAN	Private	0	258
Yokohama Metal Co., Ltd.	JAPAN	Private	1	242
Zhongyuan Gold Smelter of Zhongjin Gold Corporation	CHINA	Publicly traded	1	27721
Zijin Mining Group Co. Ltd.	CHINA	Publicly traded	0	20755

Note: Management System (MS): 0=Not having ISO or similar management system certifications

1= Having ISO or similar management system certifications

Size: Number of employees

Appendix C Tin Facilities

Smelter	Firm Location	Ownership	MS	Size
Alpha	UNITED STATES	Private	1	500
China Tin Group Co., Ltd.	CHINA	Private	1	11000
Coopermetal - Cooperativa Metalurgica De Rondonia Ltda.	BRAZIL	Private	0	1000
CV Ayi Jaya	INDONESIA	Private	0	80
CV Gita Pesona	INDONESIA	Private	0	92
CV Serumpun Sebalai	INDONESIA	Private	0	58
CV United Smelting	INDONESIA	Private	0	261
CV Venus Inti Perkasa	INDONESIA	Private	0	109
Dowa	JAPAN	Publicly traded	0	5941
Elmet S.L.U (Metallo Group)	BELGIUM	Private	1	201
EM Vinto	BOLIVIA	Private	0	700
Fenix Metals	POLAND	Private	0	50
Gejiu Non-Ferrous Metal Processing Co. Ltd.	CHINA	Private	0	359
Jiangxi Ketai Advanced Material Co., Ltd.	CHINA	Private	0	100
Magnu's Minerais Metais e Ligas LTDA	BRAZIL	Private	0	400
Malaysia Smelting Corporation (MSC)	MALAYSIA	Private	0	1500
Melt Metais e Ligas S/A	BRAZIL	Private	1	200
Metallic Resources, Inc	UNITED STATES	Private	1	27
Metallo Chimique	BELGIUM	Private	1	201

Smelter	Firm Location	Ownership	MS	Size
Mineracao Taboca S.A.	PERU	Private	1	1206
Minsur	PERU	Private	0	1206
Mitsubishi Materials Corporation	JAPAN	Publicly traded	1	23413
O.M. Manufacturing (Thailand) Co. Ltd.	JAPAN	Private	0	75
O.M. Manufacturing Philippines, Inc.	JAPAN	Private	0	75
Operaciones Metalurgical SA	BOLIVIA	Private	0	200
PT Aries Kencana Sejahtera	INDONESIA	Private	0	162
PT Artha Cipta Langgeng	INDONESIA	Private	0	68
PT ATD Makmur Mandiri Jaya	INDONESIA	Private	0	150
PT Babel Inti Perkasa	INDONESIA	Publicly traded	0	139
PT Bangka Prima Tin	INDONESIA	Private	0	59
PT Bangka Tin Industry	INDONESIA	Private	0	171
PT Belitung Industri Sejahtera	INDONESIA	Private	0	150
PT BilliTin Makmur Lestari	INDONESIA	Private	0	97
PT Bukit Timah	INDONESIA	Publicly traded	0	351
PT Cipta Persada Mulia	INDONESIA	Private	0	61
PT DS Jaya Abadi	INDONESIA	Private	0	117
PT Eunindo Usaha Mandiri	INDONESIA	Private	0	90
PT Inti Stania Prima	INDONESIA	private	0	144
PT Justindo	INDONESIA	private	0	75
PT Mitra Stania Prima	INDONESIA	Private	1	50

Smelter	Firm Location	Ownership	MS	Size
PT Panca Mega Persada	INDONESIA	Private	0	22
PT Prima Timah Utama	INDONESIA	Private	1	1072
PT Refined Banka Tin	INDONESIA	Private	1	75
PT Sariwiguna Binasentosa	INDONESIA	Private	0	99
PT Stanindo Inti Perkasa	INDONESIA	Private	0	90
PT Sukses Inti Makmur	INDONESIA	Private	0	48
PT Sumber Jaya Indah	INDONESIA	Private	0	90
PT Timah (Persero) Tbk Kunder	INDONESIA	publicly traded	1	1300
PT Timah (Persero) Tbk Mentok	INDONESIA	publicly traded	1	2063
PT Tinindo Inter Nusa	INDONESIA	Private	0	170
PT Tommy Utama	INDONESIA	Private	0	126
PT Wahana Perkit Jaya	INDONESIA	Private	0	12
Resind Indústria e Comércio Ltda	BRAZIL	Private	0	20
Rui Da Hung	TAIWAN	Private	1	56
Soft Metais Ltda.	BRAZIL	Private	1	20
Thaisarco	THAILAND	Private	1	1760
VQB Mineral and Trading Group JSC	VIETNAM	Private	0	400
White Solder Metalurgia e Mineracao Ltda.	BRAZIL	Private	1	200
Yunnan Tin Company Ltd.	CHINA	State-owned	1	60000

Note: Management System (MS): 0=Not having ISO or similar management system certifications

1= Having ISO or similar management system certifications

Size: Number of employees

Appendix D Tungsten Facilities

Smelter	Firm Location	Ownership	MS	Size
A.L.M.T. TUNGSTEN Corp.	JAPAN	Private	1	2315
Asia Tungsten Products Vietnam Ltd	CHINA	Private	1	750
Chenzhou Diamond Tungsten Products Co.,Ltd.	CHINA	State-owned	1	272
Chongyi Zhangyuan Tungsten Co. Ltd.	CHINA	Publicly traded	1	3380
Fujian Jinxin Tungsten Co. Ltd.	CHINA	Private	1	500
Ganzhou Huaxing Tungsten Products Co. Ltd.	CHINA	State-owned	1	244
Ganzhou Jiangwu Ferrotungsten Co. Ltd.	CHINA	State-owned	1	750
Ganzhou Seadragon W & Mo Co., Ltd.	CHINA	Private	1	500
Ganzhou Yatai Tungsten Co.,Ltd	UNITED STATES	Private	0	750
Global Tungsten & Powders Corp.	UNITED STATES	Private	1	5000
Guangdong Xianglu Tungsten Co., Ltd.	CHINA	Publicly traded	0	500
H.C. Starck GmbH	GERMANY	Private	1	2925
H.C. Starck Smelting GmbH & Co.KG	GERMANY	Private	1	2926
Hunan Chenzhou Mining Group Co.	CHINA	private	1	750
Hunan Chun-Chang Nonferrous Smelting & Concentrating Co. Ltd.	CHINA	Private	0	320
Hydrometallurg JSC	RUSSIAN FEDERATION	Private	0	100
Japan New Metals Co. Ltd.	JAPAN	Private	1	750
Jiangxi Gan Bei Tungsten Co. Ltd.	CHINA	State-owned	1	177000
Jiangxi Xiushui Xianggan Nonferrous Metals Co., Ltd.	CHINA	State-owned	0	75

Smelter	Firm Location	Ownership	MS	Size
Kennametal Huntsville	UNITED STATES	Publicly traded	1	12718
Malipo Haiyu Tungsten Co. Ltd.	CHINA	Publicly traded	1	11250
Niagara Refining LLC	UNITED STATES	Private	0	100
Nui Phao H.C. Starck Tungsten Chemicals Manufacturing LLC	GERMANY	Private	0	2926
Tejing Tungsten Co. Ltd.	UNITED STATES	Private	1	200
Vietnam Youngsun Tungsten Industry Co., Ltd.	CHINA	Private	1	500
Wolfram Bergbau und Hutten AG	AUSTRIA	Private	1	250
Xiamen Tungsten (H.C) Co. Ltd.	CHINA	Publicly traded	1	11135
Xiamen Tungsten Co. Ltd.	CHINA	Publicly traded	1	11135
Xinhai Rendan Shaoguan Tungsten Co. Ltd.	CHINA	Private	1	75

Note: Management System (MS): 0=Not having ISO or similar management system certifications

1= Having ISO or similar management system certifications

Size: Number of employees

Appendix E Gold Facilities That Have Participated in RJC or LBMA

Smelter	Firm Location	Gold Programs	Implementation Period (Day)
Allgemeine Gold-und Silberscheideanstalt A.G.	GERMANY	LBMA & RJC	1
Aurubis AG	GERMANY	LBMA	1
Bangko Sentralng Pilipinas	PHILIPPINES	LBMA	1
Boliden AB	SWEDEN	LBMA	1
Emirates Gold DMCC	UNITED ARAB EMIRATES	LBMA	1
Jiangxi Copper Company Ltd.	CHINA	LBMA	1
JX Nippon Mining & Metals Co. Ltd.	JAPAN	LBMA	1
Kazzinc Ltd.	KAZAKHSTAN	LBMA	1
L'azurde Company for Jewelry	SAUDI ARABIA	LBMA	1
Mitsubishi Materials Corporation	JAPAN	LBMA	1
Mitsui Mining and Smelting Co. Ltd.	JAPAN	LBMA	1
MMTC-PAMP India Pvt Ltd.	INDIA	LBMA	1
Moscow Special Alloys Processing Plant	RUSSIAN FEDERATION	LBMA	1
Ögussa Österreichische Gold- und Silber-Scheideanstalt GmbH	AUSTRIA	RJC	1
OJSC Novosibirsk Refinery	RUSSIAN FEDERATION	LBMA	1
PAMP S.A.	SWITZERLAND	LBMA	1
Prioksky Plant of Non-Ferrous Metals	RUSSIAN FEDERATION	LBMA	1
PT Aneka Tambang (Persero) Tbk	INDONESIA	LBMA	1
Republic Metals Corporation	UNITED STATES	LBMA & RJC	1

Smelter	Firm Location	Gold Programs	Implementation Period (Day)
Schone Edelmetaal	NETHERLANDS	LBMA	1
Shandong Zhaojin Gold & Silver Refinery Co. Ltd.	CHINA	LBMA	1
The Refinery of Shandong Gold Mining Co. Ltd.	CHINA	LBMA	1
Umicore Precious Metals Thailand	BELGIUM	RJC	1
Zhongyuan Gold Smelter of Zhongjin Gold Corporation	CHINA	LBMA	1
Zijin Mining Group Co. Ltd.	CHINA	LBMA	1