



Bachelorthesis

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Title:

Meeting the challenges of sustainability in global supply chains with a special reference to conflict minerals

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Abstract

This bachelor thesis critically analyzes how sustainability can be accomplished in global supply chains, facing various challenges such as complexities, implementation and conformity issues, regulation and framework related deviations and difficulties in transparency. In order to get a deeper understanding of what managing sustainability in supply chains practically means this thesis refers to the sourcing of tin, tungsten, tantalum and gold, known as 3TG. On the one hand, by looking at four sources it narrows the scope to investigate down, makes sustainability approachable and thereby gives a good insight about sustainability implications in a supply chain. On the other hand, those minerals are highly significant for meeting today's drive of digitalization. Tech companies such as Intel and Fairphone claim to have managed a conflict free supply chain on product and portfolio level. But also other players such as HP and Umicore have found systems to approach conflict minerals. By looking at company examples recommendations can be derived. Therefore, this thesis shows that despite the challenges of sustainability in supply chains, challenges can only be met when there is a holistic supply chain management that considers complexity and recognizes measurable criteria of sustainability in its entity. This makes this thesis valuable for supply chain practitioners that want to achieve sustainability and for academics who strive for further research on that field.

Keywords: Supply Chain, Supply Chain Management, Sustainability, Conflict Minerals, 3TG

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III. List of abbreviations

SC	Supply Chain
SCM	Supply Chain Management
SDG	Sustainable Development Goals
BMBF	Federal Ministry for Education and Research
DERA	German General Research Agency
OECD	Organization for Economic Cooperation and Development
DRC	Democratic Republic of the Congo
TBL	Triple Bottom Line
MNE	Multinational Enterprise
LSM	Large-scale mining
ASM	Artisanal and small-scale mining
CAHARAs	Conflict affected and high risk areas
RMAP	Responsible Minerals Assurance Process
RMI	Responsible Minerals Initiative
ITSCI	International Tin Research Institute Supply Chain Initiative
SRC	Supplier Report Card

1 Introduction

Due to globalization, the world has been knitted together and business processes became more complex, what has intensified the need of a capable management that is able to lead today's business (Bayoumi , Appendino , Barkema , & Cerdeiro , 2018, p. 17). One crucial element in global business operations is the supply chain and its management (Corominas , 2013, p. 6828). As the supply chain (SC) is becoming more sophisticated, supply chain management (SCM) needs to meet various requirements (Lummus & Vokurka , 1999, p. 12). One current development lies within the multistakeholder call for action to operate more sustainable (O'Rourke , 2014, p. 1124).

This request leads to the SCM issue in how exactly sustainability in SCs can be realized (Mann , Kuma , Kumar , & Jit Singh Mann , 2010, p. 53). Various sustainability implications need to be considered and challenges in complexity, conformity and implementation, frameworks and regulations as well as in transparency occur (Koberg & Longoni , 2019, p. 1085 ff.). Due to the complex nature of this issue, the topic of sustainability in SCs becomes approachable and the challenges connected to this topic clearer when looking at the Tech Industry and its sustainability related sourcing issues (Pilgrim , 2017, p. 12). The fast technological development has made minerals such as tin, tungsten, tantalum and gold, known as 3TG extremely relevant for that industry in order to keep up with the innovative speed (Dahm & Thode, 2018, p.3 ff.). The sourcing of these minerals is important but at the same time, it is also heavily discussed because of its negative effects on conflicts, people and environment (Moncel, 2016, p. 217 ff.). By referring to this sustainability related supply chain issue an overall understanding of sustainability in global supply chains can be gained. Thus, the underlying question of this thesis is: Despite challenges of sustainability in supply chains, how can sustainability be accomplished in global SCs? Academically proposed and practical sustainability solutions for the SC deviate. But looking at company examples and how they face these challenges closes this gap and in addition recommendations on how to meet the challenges of sustainability can be derived. For the purpose of this thesis, the research method consists of gathering relevant data from current primary sources ensuring its validity and relevance. The data collected will include gathering information from desk-research, thus using a theoretical literature based approach.

Based upon the research question that has been postulated in Chapter 1, supply chain and supply chain management will be briefly defined and distinguished in 2.1. Furthermore, in 2.2 sustainability and conflict minerals will be shortly introduced and their connection to SC through their background underlined.

In chapter 3, challenges of sustainability in supply chain will be critically analyzed. Thus in, 3.1 complexities in the meaning of sustainability and in its concept will be elaborated on and complexities of the SC highlighted. The subchapter ends with the supply chain of conflict minerals what lays the ground for deeper understanding of the challenges that will be discussed in the subsequent chapters. Thus, in 3.2 conformity and implementation will be topic and recent sustainable supply chain trends will be described. In 3.3 regulations and frameworks such as OECD Guidelines, Sustainable Development Goals, Dodd Frank Act and EU guidelines will be introduced and in 3.4, the challenge of transparency through due diligence will be investigated on.

After having an understanding about the underlying challenges of sustainability in global SCs chapter 4 discusses how companies deal with these challenges and what recommendations can be derived. Thus, in 4.1 a brief introduction about the companies that will be investigated will be given. In addition, it will be underlined what sources are used for the analysis. Thereafter, chapter 4.2 investigates through subchapter 4.2.1 and 4.2.2 what companies consider as sustainability and to what extent complexities including conflict mineral specific complexities are faced and what complexity recommendations can be given. Chapter 4.3 deals through subchapter 4.3.1 and 4.3.2 how companies approach sustainability, what they are conforming on, and how they implement on what they conformed on. Furthermore, recommendations are provided. Chapter 4.4 examines through subchapter 4.4.1 and 4.4.2 which regulations and frameworks companies use, how they stand towards them and what recommendations can be derived. Lastly, chapter 4.5 evaluates through subchapters 4.5.1 and 4.5.2 how the companies try to establish transparency through due diligence and what can be recommended.

Finally, chapter 5 will conclude the findings and comprises the outcome of this thesis. Furthermore, it will answer the research question “Despite challenges of sustainability in supply chains, how can sustainability be accomplished in global SCs?” and will provide a critical acclaim and an outlook for the development of sustainable supply chain management in regard to conflict minerals and the increasing importance of this topic.

2 Demarcation and theoretical background

2.1 Supply chain and supply chain management

The idea of “supply chain” and “supply chain management” are closely related to one another but they do have different notions, which will be introduced in the following.

The concept of SC has gained popularity over the years and its origin has been academically developed first by Jay Forrester in 1961 (Kopczak & Johnson, 2002, p. 27 ff.). He enforced the idea that company success depends on the interaction between the flows of material, capital and information, which became known as the supply chain (Corominas , 2013, p. 6829). Since then, various definitions try to define the characteristics of the SC (Lummus & Vokurka , 1999, p. 11). However, the shared understanding lies in the idea of picturing the SC as a process from the initial raw material to the ultimate consumption to the final product passing different stages up and downstream, what is illustrated in Figure 1. Upstream refers to steps towards the source and downstream to steps towards the customer (Christopher, 2016, p. 13 f.).

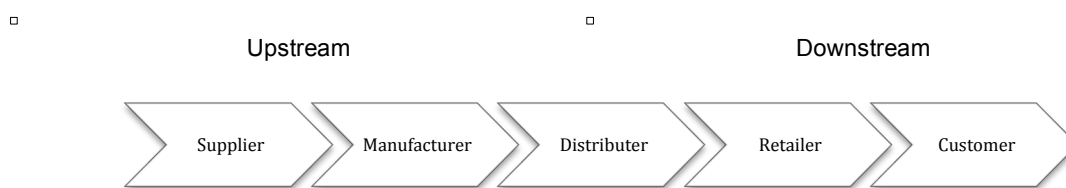


Figure 1: The supply chain, own illustration based on (OECD, 2016)

According to the Supply Chain Council, these processes imply every effort involved in producing and delivering a final product from the supplier's supplier to the customer's customer (Lummus & Vokurka , 1999, p. 13). Thus, in this bachelor thesis, the term SC is used in its broadest sense to describe it as a network of all parties that are indirectly or directly involved in order to fulfill a customer request. This means that in addition to considering supplier, manufacturers, distributor, retailer and customer, a larger scope must be included as part of the supply chain such as logistics, marketing and customer service, suppliers' supplier and manufacturers' manufacturer and so on (Christopher, 2016,p. 13ff).

Even though the ideas of SC and SCM have been developed at the same time, they are to be differentiated. Thus, supply chain management can be understood as being at a superior sphere guiding the SC (Christopher, 2016, p. 23). Looking back at the origin of the supply chain definition by Forester it is interesting to notice his understanding of supply chain management. Forester underlined that managers need to have an understanding of the importance of interrelationships between the company and its markets but also between separate company functions (Corominas , 2013, p. 6829). This has been proven as essential for today's supply chain management and indicates to see a firm not in isolation but as part of a complex network (Christopher, 2016, p. 63).

His studies and theories concerning SC have been directing today's understanding of SCM. One example is his idea that small interruptions in the SC can quickly become magnified

through the entire supply chains as an effect what is known as the “bullwhip effect” (Christopher, 2016, p. 200). This shows, that there is a need to have a specific management that has an overview of the entire chain and its components with a perspective that goes beyond the own entity. Thus, having an own supply chain management discipline that focuses on the parties involved, the interrelationships and goals of the SC is crucial (Corominas , 2013, p. 6830).

2.2 Sustainability and conflict minerals

In order to understand the connection of sustainability and conflict minerals for the SC and SCM it is important to note that although the term “sustainability” has gained rising prominence for businesses and popularity among customers, it is still difficult to clearly determine what lies behind it. Chapter 3.1.1 will provide details of its complexity in definition and concept. For now it should be understood as a concept where companies are required to meet the needs of the stakeholders of today but also of its stakeholder in the future, while taken into account that there need to be specific areas of relevance considered in order to fulfill sustainability (Dyllick & Hockerts, 2002, p. 3). Even though different interpretations exist, scholars and practitioners agree on the very aspect, that sustainability cannot just mean to focus on one area of relevance such as just on economic aspects or social or environmental aspects but rather to consider a broad set up of factors (Dyllick & Hockerts, 2002, p. 4).

When implementing this sustainability understanding into supply chain, it becomes approachable, by taking a first look at the useful supply chain relevant topic of “conflict minerals”. Generally, minerals whose trade and systematic exploitation subsidizes human rights violations in the country of mining and surrounding are called „conflict minerals“, whereby „systematic exploitation“, „human right violations“ and all its consequences are referred to as „conflict“ (Hofmann, Schleper, & Blome, 2015, p. 115). Tin, tantalum, tungsten and gold are mostly considered as the four “conflict minerals”, also referred to as 3TG. They play a crucial role for SCs in the technology industry as the minerals can be found in everyday products such as consumer electronics for example smartphones and tablets but also other industries are affected operating with cars or jewelry that contain 3TG (Moncel, 2016, p. 220). The relevance of conflict minerals as well as its connection to the SC can be found in the current era of digitalization (Albohassan, 2016, p. 28). As an omnipresent development, it shapes today’s business operations (Dahm & Thode, Strategie und Transformation im digitalen Zeitalter, 2018, p. 3). Technologies such as sensors, displays, robotics and high-speed performance chips will be even more important in the future (Pilgrim , 2017, p. 14). Furthermore, social and political topics such as electro mobility and the energy transition are also directly connected to digitalization and leverage the demand on conflict

minerals (Dahm & Thode, *Strategie und Transformation im digitalen Zeitalter*, 2018, p. 92). Due to the high specification in use, such as density, conductivity, weight and elasticity, these resources are not interchangeable. A study derived by DERA (German General Research Agency) points out the dependency on these resources for future technologies and their demands (Pilgrim, 2017, p. 12). Having conflict minerals in the supply chain, sustainable related questions arise directly due to the questionable conditions under which these conflict mineral demands are fulfilled. As it is heavily criticized by various scholars as well as organizations and activists it powerfully illustrates the issue of meeting the demand of certain resources of stakeholders of today while having dramatic direct and indirect consequences for stakeholders now and in the future (Koyame-Marsh & Perkins, 2013, p. 12). Due to its connection to a mix of social, economic and environmental level such as child labor and environmental damages, it provides an idea of relevant areas that need to be considered under sustainability for that case (Köhler, Dossig, & Esch, 2018, p. 9).

Especially the east Democratic Republic of the Congo (DRC) also referred as Great Lakes Region, which is rich in those minerals has found wide attention due to the fact that the extraction of the minerals has intensified tensions between the national army and rebel groups, resulting in serious conflicts and widespread consequences for the people and the country (Koyame-Marsh & Perkins, 2013, p. 4 ff.). Furthermore, the extraction and trade of these “conflict resources” support armed groups financially, which is highly controversial (Miho, 2016, p. 41). Historically the DRC has been shaped by violence since its independence in 1960. Thus, in the 90s the DRC was place of conflicts due to a wave of over seven hundred thousands refugees that fled from the Rwandan Genocide. Political turmoil, instability, fatality and massive human rights violations from rebel groups as well as from army representatives were the consequences. Today the DRC, faces additional challenges due to economic collapse, weak governance capacity, poverty and lack of infrastructures. However, one of the key factors of the main conflicts in the eastern DRC today is the mining of the 3TG (Miho, 2016, p. 42). Thus, armed groups, rebels, as well as national army commanders have taken advantage of the mineral resources and started to violently control the mines and sell the minerals to smelters and refiners, what in return finances further conflicts (Moncel, 2016, p. 221). As long as trade, control, taxation, exploitation or protection of these resources take place, there is a contribution to armed conflicts and there is a high possibility that armed conflicts benefit from it, what than intensifies the conflicts. UN Panels of Experts and NGOs such as “Global Witness” highlighted the role of businesses to boost the conflict and call for action. Not only by companies but also by governments and consumers and point out that the entire SC including the resources and their implications have to be considered when doing business (Miho, 2016, p. 40).

3 Challenges of sustainability in supply chain

3.1 Complexity

3.1.1 Complexity of sustainability meaning and concept

In order to meet the challenges of sustainability in SC it is important to realize what those challenges entail and to understand that the challenges are not standing alone but are rather connected to each other. As chapter 2 already introduced demarcation and theoretical backgrounds of SC, SCM, sustainability and conflict minerals, it is obvious that one of the key challenge lies within the complexity of all components just mentioned. To start with, the complexity of the meaning and concept of sustainability will be discussed.

The meaning and concept of sustainability does have an evolving nature and the root of its complexity is the lack of a general worldwide-accepted clear definition of sustainability and its indicators (Montiel & Delgado-Ceballos , 2014, p. 8 f.). Sustainability was first defined in 1713 as term “Nachhaltigkeit” by the German general Hans Carl von Carlowitz in the context of forestry. This meant to understand sustainability as stewardship and preserving natural resources for the future generations (Englert & Ternès , 2019, p. 109). After the sustainability term occurred the first time, it was changed into a policy concept the so-called Brundtland Report in 1989. This report aimed to discuss the tensions between the aspiration of mankind to have a better life and the limitations that are imposed by nature. In this context two opposing views are outstanding and show the tension between adaptation and harmony on the one hand and to see nature as something that needs to be conquered on the other hand (Kuhlman & Farrington , 2010). The opposition between development and the environment, needs and resources as well as short- and long-term perspectives are underlined in the report and already give an insight how complex the meaning and concept of sustainability already were at the beginning. As the time proceeded, variations such as corporate sustainability, corporate social responsibility, corporate social performance, environmental strategies, environmental performance and ecological footprints as related topics were developing and were subject of further studies, each of them bringing their own understanding and aspect of sustainability in the pool of what sustainability can entail (Montiel & Delgado-Ceballos , 2014, p. 1). The broad use of the term sustainability in supply chain context is often equated with the term “corporate sustainability”. This is defined as an aim to meet the needs of a firm’s direct and indirect stakeholders, such as employees, clients, pressure groups, communities, and shareholders without compromising the ability to meet the needs of future stakeholders (Dyllick & Hockerts, 2002, p. 2). This definition aligns with the mindset of stewardship but leverages it into a corporate level, considering different stakeholder groups. However, this term is widely used in specialized academic literature. It additionally can be conceptualized via different approaches such as fact-centered studies,

traditional organizational theories or through new frameworks what brings again additional perspectives into this topic but what will not be deeper investigated for this thesis (Montiel & Delgado-Ceballos , 2014, p. 12). A study derived by Ivan Montiel and Javier Delgado-Ceballos shows those different perspectives, thus differences in notion and meaning are occurring, depending on where the terminology is found. In Top Academic Management Journals terms such as sustaincentrism, ecological sustainability, sustainable development, corporate sustainable development, corporate sustainability and sustaincentric orientation are being used, while in practitioner Management Journals rather terms such as “ideal” sustainable organization, sustainable organization, sustainable development innovation and sustainable enterprise are used to describe sustainability topics, although there are overlaps in meaning (Montiel & Delgado-Ceballos , 2014, p. 113 ff.).

Although many different sustainability related terminologies exist, two major concepts and a trend are polarizing. One is the interpretation of what exactly are areas of relevance, defining them as ecological, social and economic dimensions that somehow stand in relation to each other. The other one is the distinction between strong and weak sustainability and the trend towards a more holistic understanding of sustainability (Kuhlman & Farrington , 2010). The economic, social and ecological dimensions, known as triple bottom line (TBL), was coined by Ellington and is viewed as a refocus of the scope of sustainability towards a more rigorous thinking that considers an accurate balance of the complex dimensions of sustainability (Montiel & Delgado-Ceballos , 2014, p. 2). In addition, dividing sustainability in three different areas made the concept applicable and allows to find specific targets and look for specific information which can then be instrumentalized for example in form of sustainability reports (Özçelik & Öztürk , 2014, p. 262).

The following discusses what those TBL dimensions entail in detail. First of all it is important to stress once again how important it is that it is not enough to focus solely on economic sustainability (Alhaddi, 2015, p. 8). A single-minded focus can succeed in the short term but not in the long term (Rockström, D.Sachs, Öhman, & Schmidt-Traub, 2015, p. 2). One perspective is that all three aspects of the triple bottom line have to be satisfied simultaneously. According to the concept of Ellington all three dimensions of the triple bottom line are interrelated and may influence each other in various ways. That also implies to integrate long and short-term perspectives (Dyllick & Hockerts, 2002, p. 3). The profit pillar can be expressed as GDP (gross domestic product) and translated as the money made by an entire country. On company-level this would mean an economically sustainable entity is characterized by the fact that it is able to guarantee sufficient cash flows at any time to ensure liquidity and it is able to produce a persistent above average return for their

shareholders (Dyllick & Hockerts, 2002, p. 4). Thus, the economic activity would be in focus. However, viewing the economic pillar as equation of money is a very limited view of economics. Therefore, it is also suggested to add to the plainly monetary perspective a human development index that would add education and life expectancy criteria as social notions to the monetary economic perspective (Kuhlman & Farrington , 2010, p. 4). The underlying idea is that, there is a broader definition of capital required which than need different approaches due to different properties addressed (Dyllick & Hockerts, 2002, p. 3).

The next pillar is the environmental dimension, which draws lot of attention, referred to the ecological dimension (Özçelik & Öztürk , 2014, p. 260). To be sustainable in terms of considering the environment can mean for a company to use only natural resources that are consumed at a rate below the natural reproduction, or at a rate below the development of substitutes (Wu & Wu , 2012, p. 68). Additionally, it entails not to cause emissions that accumulate in the environment at a rate beyond the capacity of the natural system to absorb and assimilate these emissions. Finally, it means no engagement in activities that degrade eco-system services (Dyllick & Hockerts, 2002, p. 4).

Lastly, the social dimension, which is concerned with everything else connected to human aspirations. A company can call itself socially sustainable if they add value to the communities within which they operate (Wu & Wu , 2012, p. 76). Thus, it indicates to increase the human capital of individual partners as well as to further the societal capital of these communities. Furthermore, they manage this capital in such a way that stakeholders can understand its motivations and can broadly agree with the company's value system (Dyllick & Hockerts, 2002, p. 5).

The most current development of the concept is the idea of planetary boundaries with strong and weak sustainability leading to a holistic approach (Nabavi, Daniell, & Najafi, 2017, p. 313). More precisely, strong sustainability means limitation of the substitutability of natural resources by other types of inputs. In contrast, weak sustainability means that resources of any kind are perfectly substitutable (Kuhlman & Farrington , 2010, p. 3438). Having this in mind it leads to the understanding that consequently economic, social and environmental topics are interrelated and have to be considered equally with a holistic perspective (Wu & Wu , 2012, p. 65). According to Kuhlman and Farrington, sustainability can therefore be defined as a state of affairs, where the sum of natural and man-made resources remains at least constant for the foreseeable future in order that the well-being of the future generations does not decline. Whereas well-being corresponds with the social and economic dimension

of the triple bottom line and sustainability with the environmental dimension of it (Kuhlman & Farrington , 2010, p. 3442).

A variety of definitions and ideas had been provided to give an insight about the complex understanding of sustainability. In this bachelor thesis sustainability should be understood as a holistic concept where companies are asked to consider the needs of the stakeholders of today but also of its stakeholder in the future, while taking into account that there need to be specific areas of relevance within the economical, ecological and social dimension according to the TBL which are interlinked and correlated and therefore have to be considered holistically.

3.1.2 Complexity of supply chain

Complexities of the supply chains are one of the major challenges of sustainability in the supply chain (Science Direct, 2008). As previously mentioned, the definitional roots of SC were formulated by Fosterer and align with later findings of Quinn and his definition of supply chain that sees the source of complexity in SC in the network and number of suppliers (Christopher, 2016, p. 212). Thus, he stated that the SC implies those activities that are associated with moving goods from the raw material stage through to the end user whereby sourcing and procurement, production scheduling, order processing, inventory management, transportation, warehousing, and customer service are included and need to work together (Lummus & Vokurka , 1999, p. 11). That means considering all different parties involved and their degree of interrelationships, the complexity finds its representation by the so called supply chain tiers which describe the number of parties and the level they stand to each other (Lummus & Vokurka , 1999). Therefore, SCs should rather be understood as a party that has its own authorities but it is part of a complex web of interrelated and interconnected entities. Furthermore, Christopher underlines that complexity should not be pictured as equal to complicated but instead as a common SC characteristic (Christopher, 2016, p. 207). The consequences of these relationships are uncertainties that automatically lead to forecast errors (Brockhaus, Kersten, & Knemeyer, 2013, p. 168). It is important to keep this in mind in order to have an understanding what it means for supply chain management when wanting to accomplish sustainability in SC (Brockhaus, Kersten, & Knemeyer, 2013, p. 167 ff.). In addition, it is important to consider what perspective it adds when including the customer in the SC. To consider the customer as part of the supply chain provides a clear differentiation to logistics which is further concerned with the flow of materials from one target to another, while seeing the customer as destination. In SC customers are rather seen as partners what means that the design of a SC must consider customers as a SC member (Corominas , 2013, p. 6831). That can directly result into adding three other aspects that increase SC complexity which refer to the product, to the range and to the process (Christopher, 2016, p.

207). The more complex and unique the product and the more variants exist, the more complex becomes the supply chain. The more steps in a process and the more hands involved, the greater the chance that there will be discrepancies between planned and actual proceedings (Christopher , 2016, p. 210 f.) Information systems are viewed as essential in order to monitor all of those activities, to avoid interruptions and therefore belong to the SC and also increases complexity (Lummus & Vokurka , 1999). Looking at all these components, complexity has different sources but the major challenge however lies in the complex correlations of each of these factors themselves which will become clearer in the following chapter when assessing the supply chain of conflict minerals.

3.1.3 Supply chain of conflict minerals

Generally, mineral supply chains consist of mining, transport, handling, trading, processing, refiners and smelters what would be upstream the supply chain. Manufacturing and sale are steps afterwards and are known as components downstream the supply (OECD, 2016, p. 14). Bringing the raw minerals to the consumer involves various actors and the OECD distinguishes in its evaluations of conflict minerals between supply chains of tin, tantalum and tungsten and the supply chain of gold, which gives another idea of the complexity and various implication of the conflict mineral supply chain. For the sake of this bachelor thesis a simplification, combining similar elements of both supply chains, based on Hoffmann et al. will be used and is illustrated below in Figure 2.

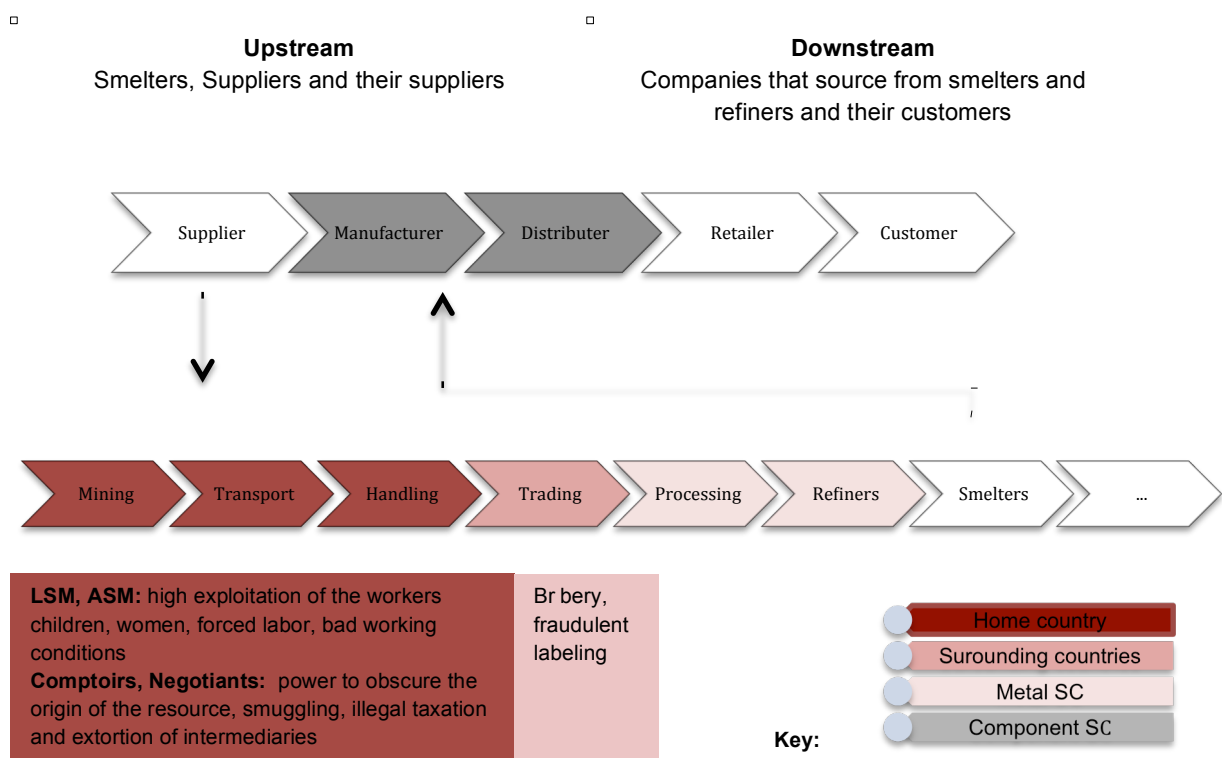


Figure 2: Supply chain of conflict minerals, own graphic based on (Hofmann, Schleper, & Blome, 2015)

As the figure shows, the mineral supply chain lies on supplier level. The start of the supply chain lies within the country where the mineral is sourced, referred as home country. Extraction takes place through commercial large-scale mining (LSM) or artisanal and small-scale mining (ASM). The situations in ASM and LSM illustrate the areas of relevance in the social and environmental dimensions of sustainability. The ASM is mostly unregulated and informal and therefore often in very poor conditions but also LSM provides no assurance of better conditions (Miho, 2016, p. 41). The mines are often characterized by high exploitation of the workers including children and women, forced labor and inhumane working conditions. That means no lights, ventilations or sanitary as well as long working days (Moncel, 2016, p. 221). In addition, further human rights violations such as sexual violence are prevalent in this context and give an idea of the widespread of the conflict (Miho, 2016, p. 40).

Furthermore, negotiants that can be seen as “middleman” and so-called “comptoirs” that are involved in buying and export are also part of the supply chain. Negotiants operate and are the party that is mostly aware of the quality of the product because they operate closely to the mine (United Nations Office on Drugs and Crime, 2011, p. 64 ff.). The “comptoirs” have the power to obscure the origin of the resource because of their role of assessing the quality of the mineral and providing basic processing. Making it difficult to trace the origin of the mineral, smuggling (United Nations Office on Drugs and Crime, 2011, p. 14) as well as illegal taxation and extortion of intermediaries are common difficulties in the extraction, transport and handling stage (Hofmann, Schleper, & Blome, 2015, p. 18). The next step in the supply chain are the traders that are often located in surrounding countries. This stage is often triggered by bribery and a high possibility of using misleading information of the origin of the mineral (Hofmann, Schleper, & Blome, 2015, p. 19). Once the mineral has been traded and finds its way to the smelter, it will be processed to a refined product. This can be seen as happening within a “metal supply chain”. Afterwards the refined product will be manufactured into a component and lastly into a final product what can be considered as happening within a “component supply chain”. Finally, it reaches the consumer for sale (Hofmann, Schleper, & Blome, 2015, p. 18). The danger of money laundering, bribery and further misinterpretations of origin of the minerals is given throughout every stage of the chain.

Looking at the complexity of the conflict mineral issue and the widespread of coherent consequences for the country and the people, this all has led to a relevant shift in the idea of how to manage a supply chain and what needs to be considered when targeting sustainability in the supply chain (Miho, 2016, p. 37). Overall, this already highlights how deep the implications of each sustainability dimension can go and how they are closely related and intervened and therefore how important it is to have a holistic sustainability perspective to successfully implement sustainability in SC.

3.2 Conformity and implementation

Having the complexities of sustainability, SC and conflict minerals in mind the question arises how to manage sustainability in the global SC, what leads to the next challenge, which is the challenge of conformity on sustainability among the supply chain participants and its practical implementation on SC level.

Generally, when researching for sustainability approaches in supply chain literature, green logistics, closed loop and reverse logistics are the most common suggestions (Faisal , 2010, p. 509). However, these solutions cannot be generalized and applied for all sustainability topics in supply chain, what can be seen when looking for solutions concerning conflict minerals (Global Witness, 2010, p. 2). Sustainability implementations connected to 3TG rather find solutions on the level of setting a clear ground based on a common understanding and accurate documentation (HP, 2017) (Intel, 2019) (Umicore, 2018) (Fairphone, 2017) .

Mostly sustainability in SC is not directly associated with the complex topic of conflict minerals but rather in light of the environmental dimension of sustainability (Brix-Asala, Greisbüsch, Sauer, Schöpflin, & Zehendner, 2018, p. 5 ff.). The reason for that can be found in the increased awareness on environmental issues that are directly visible such as global warming and the increase in legislations on producer responsibility (Flapper, van Nunen, & Van Wassenhove, 2005, p. 9). Companies are required to take back products from customers and to organize for proper disposal and recovery which forces the supply chain managers to design their supply chain accordingly resulting in economic and environmental sustainability considerations (Flapper, van Nunen, & Van Wassenhove, 2005, p. 10). Another reason can be found in the distance towards the problem and the direct opportunities for improvement and the efforts connected (Brockhaus, Kersten, & Knemeyer, 2013, p. 168). Environmental issues are often more obvious and easier to tackle as they are often found in the direct hands of the companies not having multiple tiers in between before the problem can be unraveled. Companies claim to have easier opportunities to reengineer their supply chain to reduce waste rather than being able to face social issues that lie upstream and that are not directly visible (Bals & L. Tate , 2018, p. 58). In the course of this trend, closed loop methods and reverse logistics have gained academic and practical acceptance for successful implementation of environmental implications (O'Rourke , 2014, p. 1127). Unfortunately, this also gives a first misleading impression that implementing sustainability in supply chain through a one-dimensional approach of just focusing on environmental and economic aspects suffices. (Flapper, van Nunen, & Van Wassenhove, 2005, p. 156).

When looking at “green logistics” it becomes quickly clear how it does not suffice hence it just focuses on fulfilling environmental standards in SC (Mann , Kumar , Kumar , & Mann , 2010)

and when considering supply chain issues such as conflict minerals which is also highly controversial in terms of social issues, it shows that this is beyond environmental standards. Reverse and closed loop solutions are more appropriate but there is also room for improvement. Reverse logistics in its broadest sense can be defined as the process of moving or transporting new or used products “back up stream” for repair, reuse, resale, scrap, salvage and refurbishing or recycling. This often goes hand in hand with a “closed loop” where output becomes the input (Christopher, 2016 , p. 324).

This can be viewed as helpful as it tries to consider the entire supply chain and for conflict minerals, this is needed in order to include all relevant aspects. On the one hand, it implies the reuse of good and material in a supply chain and on the other hand, it adds the purpose to move the good from the typical final destination to a stage where its value is recaptured or where it is disposed properly (Presley, Meade, & Sarkis, 2007, p. 4605). Especially proper disposal is highly significant for technological products where conflict minerals are included because of the hazardous to health and contamination of earth when not done accurately. Although it is a start, critics however claim that using “recycled” conflict minerals are just a means to an end and more a loop whole than really contributing towards a more sustainable supply chain because recycled minerals are even more difficult to trace as they are given special treatment so that efforts come to nothing (Thomas, 2015). Supporters however claim that reverse logistic approaches differ from the conventional supply chain approach in terms of goals, management structure, business model and process and are therefore a beneficial solution for managing sustainability in global supply chains (Kumar & Kumar, 2013, p. 156). That means internal and external management systems are used to indicate environmental performance measures that include a wider range of environmental indicators such as slow carbon footprint and environmental protection as core values what would than make room to consider other dimensions such as social aspects e.g. labor conditions (Christopher , 2016, p. 324 ff.). Therefore, reverse logistics seeks to maximize economic benefits while focusing to create a responsible enterprise that balances economic benefits with social and environmental effects, which would be highly in favor of treating the conflict mineral issue with a holistic sustainability understanding. The business process would then be characterized, by a supply chain that does not start with suppliers and ends at the stage of the end user, what is known as „Cradle to Grave “but rather by a supply chain that has a reversible and circular flow (Mann , Kuma , Kumar , & Jit Singh Mann , 2010, p. 53). That means the entire life cycle is considered by the supply chain management, thus „cradle to cradle“ and that all products waste are turned into something new or back into raw material what can be used for other purposes, known as „cradle to reincarnation“ (Kumar & Kumar, 2013, p. 156). Closed Loop SCs are especially designed and managed focusing on forward flow as well as reverse flow activities within a supply chain (Christopher, 2016, p. 324). This

mindset can be viewed as extremely beneficial and is needed in order to be able to face sustainability challenges.

Furthermore, it is noticeable that when supply chain management wants to implement sustainability in form of reversed or closed loop that they are rather not readjusting but rather try to implement combinations of closing the loop or recycling elements and take those elements material and suitable for their purposes. Furthermore it can be found that it depends on the branch which issues are more in focus and what difficulties are willed to face (Bals & L. Tate , 2018, p. 58). All in all implementation of green SCM or social aspects in SCM have been able to be implemented more or less successfully but to implement all dimensions at once remains challenging (Brix-Asala, Greisbüsch, Sauer, Schöpflin, & Zehendner, 2018, p. 2 ff.). Nevertheless, when implemented with a holistic sustainability understanding the existing methods can be a stepping-stone for the implementation of all dimensions by considering the entire supply chain (Brockhaus, Kersten, & Knemeyer, 2013, p. 178).

For conflict minerals, in particular implementation can just be achieved successfully when approaches are understood and agreed on by all supply chain participants and conformity is translated into practice. As just highlighted, one-dimensional reversed or closed loop solutions that are often suggested as SC sustainability approaches are not sufficient. Mostly, for conflict minerals implementation goes hand in hand with regulations and frameworks as they are used to facilitate proper implementation. Conformity on the other hand is tried to be assured through making the supply chain more transparent what will be both discussed in the following chapters.

3.3 Regulations and frameworks

3.3.1 OECD Guidelines for Multinational Enterprises and Sustainable Development Goals

Implementation of sustainability is often tried to be achieved through regulations and frameworks. However, another challenge lies within the obstacle of not having a common set of international legally binding standards that clarify what exactly sustainability needs to entail and what companies have to do in order to be and count as sustainable. Nevertheless, this is not a new challenge and already in 1976 global organizations such as the OECD and its members tried to find solutions by standards and principles for responsible business for multinational cooperations what is known under „OECD Guidelines for Multinational Enterprises“ (OECD, 2011, p. 17). These guidelines are divided into two parts, which are recommendations for responsible business conduct in a global context and implementation procedures (OECD, 2011, p. 3). The guidelines were mainly designed for investment relationships but intend to actively encourage companies to positively contribute

towards economic but also environmental and social progress through so called National Contact Points (van Opijnen & Oldenziel , 2011, p. 91). The guidelines cover aspects such as general policies, disclosure, human rights or environmental implications and represent the shared values of the governments of countries. Additionally, national networks help companies to implement the guidelines (OECD, 2011, p. 5).

As the need for sustainability became more severe, the OECD and its members committed to contribute towards a common understanding and established goals for companies that want to be sustainable which resulted in the formation of the sustainable development goals (SDG). The focus of both frameworks is to address global challenges, to determine how it can be contributed towards it and thereby to help achieve a more sustainable future (OECD, 2019). The SDG's are well established and businesses use them to report on their sustainability progress. The goals, which are also known as global goals, originated in Rio de Janeiro in 2012, addressing political, environmental and economic challenges and they are seen as a universal call for action (OECD, 2019). The SDG consists of 17 goals and 169 sub-targets (Vereinte Nationen, 2015). Sixteen out of the seventeen goals can be distributed into the three TBL dimensions "economical", "social" and "environmental" as introduced in 3.1.1. This also suggests that sustainability can just be accomplished when all goals are fulfilled and all stakeholders considered, which is a highly sophisticated task and therefore needs time (Özçelik & Öztürk , 2014, p. 264). Nevertheless, the 17th target tries to direct towards fulfillment by putting emphasis on collaboration which aligns with the idea of striving for a holistic approach, which was also elaborated on earlier. Especially target 17.17 emphasizes to encourage and promote effective public, public-private, and civil society partnerships as well as to build on the experience and resourcing strategies of partnerships (OECD, 2019). That indicates to consider all parties holistically and to be aware that sustainability implications do not stand next to each other individually but is rather dependent on collaborations where different perspectives can be united and where the parties contribute with their expertise. This is no coincidence but needs to be rather understood as a strategy towards establishing a holistic sustainability approach.

All in all, the SDG and the OECD guidelines seem to be appreciated by companies that strive for more sustainability. However, it needs to be underlined that those are general frameworks for sustainability topics and not designed specifically for the Supply Chain what makes applicability vague and whereby other more specified frameworks and guidelines such as the Dodd Frank act and the EU guideline need to be taken into account.

3.3.2 Dodd Frank and EU guideline

Especially in terms of conflict minerals, two frameworks are pointing the way for supply chain management which are the Dodd Frank Act and the EU guidelines for conflict minerals.

The Dodd Frank Act also known as Consumer Wall Street Reform and Protection Act is a federal US law for companies listed in the US stock exchange and came into force July 2010. It provides guidance to protect consumers, to regulate the financial markets and sets a conflict minerals provision what will be highlighted in the following. The provision is found in Section 1502 and requires publicly traded companies to report to the United States Securities and Exchange Commission whether they source conflict minerals from the DRC by carrying out supply chain due diligence, which is a tool to promote and facilitate a transparent and responsible sourcing (OECD, 2016, p. 16). Supply Chain Due Diligence is an essential element in regard of transparency and will therefore be covered in detail in 3.4. The Dodd Frank Act however tries to stop national army and rebel groups to illegally finance their fight and to foster transparency about commercial activities in foreign countries by its provision (Seay , 2012, p. 7 ff.). It is the first and until now also the only legally binding regulation regarding mineral sourcing downstream, thus for parties operating in stages after smelting until the customer stage. Furthermore, it does not ban companies from using the 3TGs but rather it works with challenging desired effects by applying the transparency based regulation theory what means to foster public action by opposing a problem (Moncel, 2016, p. 225). This approach has actually triggered the industry internationally but critics complain about the limited scope of the Dodd Frank Act and the undesirable side effects such as de facto postulating a boycott on Congolese minerals leaving people without jobs and in poorer conditions than before and not to have considered these implications (Moncel, 2016, p. 224). This highlights that also when following the guidelines and regulations on sustainability that there is always more to consider and that the management has to have a more dimensional perspective that understands the complex network (van Opijnen & Oldenziel , 2011, p. 91).

In the global trade of minerals, the EU is a major player and just a few European companies take true responsibility for their SC by properly implementing international standards (European Commission, 2019). Thus, the EU decided to formulate its own counterpart to the Dodd Frank Act on EU Level that focuses on compliance rather than sanctions (European Commission, 2017). The EU Guideline is based on the OECD standard for responsible mineral supply chains and requires companies to find and assess any relevant supply chain risks and to take steps afterwards and to manage them (European Commission, 2019). The EU wants to go beyond guidance and beyond targeting just the DRC as the Dodd Frank does but rather wants to target supply chain liability on EU importers for conflict minerals worldwide regardless of origin (Corporate Finance Lab, 2017). That means to stop conflict minerals

from being exported to the EU by motivating EU companies to contribute towards ending the conflict. Responsible sourcing of minerals and metals should be assured and prevented that global and EU refiners and smelter use conflict minerals where mine workers are being abused (European Commission, 2019). The regulation also requires to use OECD guidelines as the Dodd Frank does in order to assure comparability and standard. The new EU conflict mineral regulation was passed in May 2017 and will come into place on January 1st 2020 but the commission already encourages to start carrying out due diligence before the date (DG Trade, 2019). Outstanding is the idea of releasing an online platform where downstream companies can voluntarily share their information. This platform is currently in the test phase (European Commission, 2019).

Although efforts are made, the EU law also has its lacks and critics claim that the downsides from the Dodd Frank Act such as insufficiencies in attaining a holistic perspective, recycled metals and the complex connections to the topic were not taken into account. Furthermore, each regulation and framework consists of many steps and specificities what is a question of costs and benefits as well as a high commitment (DG Trade, 2019). Thus, coming up with a law does not necessarily guarantee that it covers all underlying complexities and connections that would be essential to end the conflict and to truly achieve a sustainable supply chain. That means for managing sustainability in global supply chains it is important to have these lacks in mind and that a holistic scope needs to be considered. Nevertheless, industry acknowledge that there has to be something done and although criticism is stated, overall the guidance has found acceptance among industry representatives as it tries to represent a harmonized and effective standard across global supply chains (Corporate Finance Lab, 2017).

3.4 Transparency through due diligence

Another challenge of sustainability in global supply chains that needs to be met is the challenge of transparency. To have a transparent supply chain is a prerequisite in order to assure conformity about sustainability in line with the SDGs, OECD Guidance, EU Law and Dodd Frank Act. It helps that accurate, reliable and consistent information can be derived and shared and it makes it possible to obtain an overall knowledge of the company itself, the supply chain, its industry and parties involved (Hofmann, Schleper, & Blome, 2015, p. 121).

One approach heavily discussed among academics and practitioners is to achieve transparency through a clear due diligence standard. According to Hoffmann et al. Supply Chain Due Diligence can be understood as ongoing, proactive and reactive process that focuses on maximizing transparency (Hofmann, Schleper, & Blome, 2015, p. 117). The

OECD has established responsible business conducts, several good practice papers and sector specific due diligence guidelines focusing on that topic (OECD, 2015, p. 13). Even though there is a high variety, each of those documents are not replacing one another but can rather be used as a supplement (OECD, 2015, p. 13). This already gives an impression of the underlying challenge in multiplicity that lies behind the aim of making the supply chain transparent through due diligence and the adjustment needed depending on the sector. For this thesis the targeted Due Diligence Guidance for Mineral Supply Chains will be highlighted. It is known as “Due diligence guidance for responsible supply chains of minerals from conflict affected and high risks areas (CAHARAs)”. High Risk areas such as the DRC are characterized by the widespread of violence, presence of armed conflict, or other risks of harming people (OECD, 2016, p. 13). According to the commodity market authority in Switzerland this guidance serves as a base for fulfilling overall supply chain due diligence (ROHMA, 2019). Moreover, according to global witness, the multistakeholder approach of the OECD, which is driven by governments, companies and NGOs has led to its benchmark status in supply chain due diligence (Global Witness, 2015).

The OECD Due Diligence guideline describes due diligence as a continuous process that helps companies to ensure that national law is agreed on and international law has been observed, resulting in respecting human rights and conflicts, thus targeting a proactive reduction on conflict mineral usage (OECD, 2016, p. 13). The core of the guideline forms a practice relevant five steps approach consisting of establishing a company management system, identification and assessment of risk in the supply chain, design and implementation of a strategy to respond the identified risks, third party audits and lastly reporting (OECD, 2016, p. 17ff.). These steps will be explained in the following paragraphs.

The first step addresses the establishment of a strong company- management-system and means that a company should publish an explicit policy setting to clarify its commitments to human rights in all its business activities (OECD, 2016, p. 17). According to Global Witness it indicates that a company should abide by UN sanctions, international and domestic law and needs to state how it is going to assess its own operations as well as its suppliers throughout its supply chain (Global Witness, 2010, p. 8). Moreover, the policy should state and show credible evidence that there is no trade in conflict minerals. Other scholars postulate that this requires an identification of the exact origin of its supply as well as the conditions under which the source is produced and a list of all parties involved. This includes extracting, trading, transporting and taxing. (OECD, 2016, p. 37)

The second step requires to identify and assess risk in the supply chain and it is the central element of due diligence according to the OECD and will therefore be paid in debt attention

in this chapter (Gilard, 2019). Risk in that context refers to anything what could contribute towards human rights abuse or what could negatively contribute to conflict (Gilard, 2019). This step is very complex because this step varies, depending on where the company stands in the SC (OECD, 2016, p. 15ff.). For companies that are downstream manufacturers, the guideline proposes that the risk assessment should focus more on verification of the due diligence systems of the smelters while upstream companies that operate with mineral concentrate should rather incorporate risk assessment on the ground in order to determine conditions of trade and origin (Global Witness, 2010, p. 9). Figure 3 gives an overview about the different steps of supply chain risk assessment. In detail, companies that use mineral concentrate need to do supply chain risk assessments by ground assessments and by review of chain of custody data. (OECD, 2016).

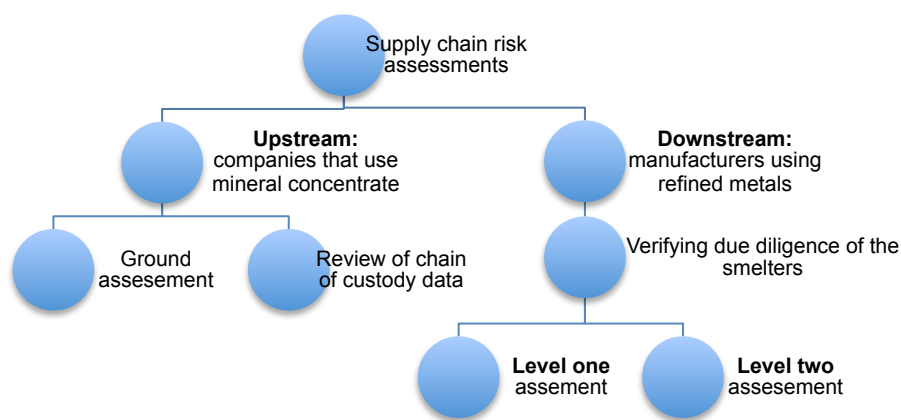


Figure 3: Overview of supply chain risk assessment, own illustration based on (OECD, 2016)

Both components are correlated and complement each other (OECD, 2016, p. 13). On the ground assessment means to establish a scope, identifying individuals to carry out the work, with the right terms of reference, preparatory research, field research and writing down findings and recommending actions by the company (Global Witness, 2010, p. 9). Overall, the main aim in this stage is to identify if there are any undesirable conflicts and human rights abuses resulting from unwanted relationships in the SC such as any connections to sourcing from mines that are controlled by armed groups that raise tax to directly or indirectly support the conflict financially (OECD, 2016, p. 35). As main instrument for gathering information, a wide range of people, that have specialist knowledge of the trade and the region should be consulted including workers of the mine, officials and civil society organizations (Hofmann, Schleper, & Blome, 2015, p. 120). Additional cross-check of the documentation through its companies own chain of custody needs to be done. After all information is gathered, findings will be noted down and recommendations derived (Global Witness, 2010).

Next to the ground assessment, reviewing the chain of custody data as second component provides significant additional insights important to achieve transparency. It is important to

differentiate the value of information (OECD, 2016, p. 41). Thus, to know the mine of origin is not the same as knowing if the minerals that are produced there are related to human right abuses or conflict. Furthermore, there is a high chance that the chain of custody tracking system is becoming corrupted due to the weak rule of laws (Global Witness, 2010, p. 11). Precise documentary information on each consignment of minerals should therefore be established and need to include the mine site, routes by which the minerals are transported, location of taxation, date of extraction and the identity of who did the mining. Furthermore, the locations at which the minerals were traded, dates of trade and identity who did the transaction as well (Global Witness, 2010, p. 18). All these steps already provide a deeper understanding of the many components that are required in order to establish a transparent and thereby truly sustainable supply chain.

The other supply chain risk assessments are for downstream manufacturers using refined metals which differs from the risk assessment of suppliers that use mineral concentrate. The differentiation lies within the main aim. No longer is the focus on the ground, it is rather the evaluation on the controls in place at the point of transformation from minerals to metal by smelters (Hofmann, Schleper, & Blome, 2015, p. 123). Therefore, smelters supply chain controls need to be assessed by establishing a scope, appointing an assessment team, carrying out preparatory research, visiting the smelter and verifying its due diligence and finally writing up findings and recommendations that should be updated annually (OECD, 2016, p. 39). Verifying due diligence of the smelters is recommended to do based on a two level assessment whereby the first level aims to find out if the smelter is sourcing a mineral from the great lakes region (Global Witness, 2010, p. 12). That indicates carrying out interviews with company staff, inspecting the smelters on site minerals stockpiles and reviewing information. So called "Red Flag indicators" that show that minerals from the great lakes region might have entered the SC should be clearly identified (OECD, 2016, p. 33f.). If something is identified, the second level evaluation would be required and determines whether the smelters purchasing practices are contributing toward the abuse of human rights or any other crimes. The Level two assessment is highly in depth and aims to determine if conflict minerals have been excluded from the supply chain and if due diligence standards have been set out (OECD, 2016, p. 55). That means all due diligence documents would have to be reviewed. In case of no evidence in clear due diligence the conclusion can be drawn that there is a high risk of conflict mineral use. If the smelters due diligence is strong information gathering should be completed by assessing at least two spot checks and one of them needs to be in the mine of origin (OECD, 2016, p. 57ff.).

After all information is gathered, conclusions need to be documented and recommendations need to be derived to determine what the manufacturer should apply. The manufacturer can

then use this next to its own information gathered to elaborate on how the supply chain is related to conflict. Thus, Level 1 evaluation is needed in order to be able to elaborate on level two (Global Witness, 2010, p. 11).

After step one and two of the guideline is fulfilled, the third step to design and implement a strategy to respond to identify risks need to be established. Once a risk is identified, it is important to decide how to accurately react to those. While actors such as German-watch, highly claim the necessity to achieve a zero tolerance approach, in practice it is not that consequent yet. Often companies do have measures to find out more about their chains but they do not respond accurately, which is critical (Global Witness, 2010).

Furthermore, step number four follows what entails to carry out independent 3rd party audits as evaluation method. It needs to be stated who carried out the most recent audit and what qualifies them to do so what often goes hand in hand with working with certificates (OECD, 2016, p. 44 f.). Certificates should guarantee that labor and human rights standards are met (OECD, 2016, p. 47f.). In this context, aspects such as human rights did gain some more attention and additional human rights due diligence focus were emphasized the UN through the UN Guiding Principles on business and human rights (United Nations, 2011, S. 17). Although there is apparently a shared interest on making the supply chain more transparent, there is always a grey zone in auditing and certification and room for interpretation and human failure such as a lack of honesty or commitment based on who is doing the process and how. Very illustrative is the recent example of “Vale” which is a multinational metal cooperation which got a mining dam issued by TÜV Süd to assure its quality although it was not safe, what came out after several workers died due to the mine dam collapsing after issuing the license which are massive violations against the sustainability understanding (DiChristopher, 2019). As the Vale example shows that relying exclusively on audit reports and certificates as evidence for good due diligence can be dangerous and that a wider range of information sources should be considered. Another aspect related to that is that sometimes companies find it difficult to establish proper audits due to the difficulty of reaching the start of the chain, such as the mine itself. This can already be an indication of a questionable source itself. Nevertheless, work by NGOs, the UN Group of Experts, journalists and others have frequently demonstrated that it is possible to research the conditions of trade in the regions of mining but is connected to making serious efforts on management level what should be addressed when following the fourth step of the guideline (Global Witness, 2010, p. 9).

Finally, the last step addresses public reporting due to the fact of high public and business interest on any kind but specifically because it is of high significance to have assurance that

effective supply chain control systems are in place, that complexities are unraveled and that the supply chain is made transparent for those involved in the international mineral supply chain (OECD, 2016, p. 52).

All in all, the guidance underlines that specific requirements and processes will differ depending on the position of the company in the supply chain as well as on the mineral itself. Nevertheless, the five steps are overall applicable and are designed to support companies in the mineral sector to meet the sustainability challenge of transparency (Vereinte Nationen, 2015). It is important to take away, that companies that operate in the mineral supply chain or use minerals sourced from conflict affected or high risk areas can apply this guideline but it is also recognized that flexibility is needed in applying it because nature and extent of the appropriate due diligence always depends on the individual circumstance of the entity. This can include size, country risks or nature of the products and shows that there is no one size fits all solution which increases the challenge of achieving transparency. Industry wide cooperation can also be a key here to overcome obstacles by building shared capacities such as sharing costs or information (OECD, 2016, p. 15). That means in order to cooperate with partners that follow the same aims through industry schemes but it has to be considered that being a member of a scheme does not on its own prove that requirements are fulfilled. However, RMI and ITSCI are two highly valued industry schemes that were published by the Responsible Mineral Initiative and the International Tin Institute covering 3TG and 3T (WEED - Weltwirtschaft, Ökologie & Entwicklung e.v, 2019, p. 20). Those schemes were assessed by the OECD and are just two out of many initiatives and organizations that try to contribute towards transparency (OECD, 2018).

4 Company Approaches

4.1 Introduction of companies analyzed and sources used

Having an understanding about the challenges of sustainability in the global supply chain with the special reference to conflict minerals, it is interesting to analyze how the companies try to meet the challenges and what recommendations can be derived. The companies that will be investigated are HP Inc. referred to as HP, Umicore, Intel and Fairphone. Those companies are all different in size and product portfolio but all have a connection to conflict minerals and follow the same aim to make the supply chain more sustainable.

HP is a multinational information technology company headquartered in California in the U.S (HP, 2017, p. 19). Operating in the computer hardware industry, their product offers ranges from printers over notebooks, monitors etc. for B2B and B2C and is known for a worldwide

leading company for printers (HP, 2017, p. 20). The company tries to cope with the conflict mineral issue but has less proactive understanding compared to the other companies.

Intel is also a technological multinational company headquartered in Santa Clara (Intel, 2019, p. 8). It is operating in the semiconductor industry what entails a wide product range such as technical platform and connectivity products, boards and systems, memory and storage (Intel, 2019, p. 10). Both companies have a very broad technological relevant product portfolio, which is highly dependent on the use of conflict minerals what makes them valuable to investigate.

In contrast to HP and Intel, Umicore is a rather unknown but highly successful company that is specialized in refining metals and catalyst, zinc chemicals and specialty materials with its headquarter in Brussels (Umicore, 2019). This company is highly interesting because its focus on raw materials but also its recognition by the UN World Economic Forum to be one of the most 100 most sustainable companies worldwide and managed to have a conflict free gold SC (Ranking the Brands, 2018).

Lastly, Fairphone, which is a privately held company that produces smartphones headquartered in Amsterdam (Fairphone, 2016). This company is often used as showpiece as it is particularly devoted to conflict minerals and to minimal social and environmental impacts, what makes it very suitable for this thesis.

Although managing sustainability into global supply chains has been a topic with rising prominence and companies such as HP, Intel, Umicore and Fairphone serve as good practice examples researchers have not treated these companies equally. Whereas HP, Intel and Umicore have been in general research scope, Fairphone did not draw much academic attention. However, in order to show and evaluate how the companies meet challenges in sustainability in the global supply chain, information will be used that are derived from reports provided by the company and from the company website itself as well as from public assessable sources such as newspaper article, blogs and related websites. Due to the dynamics of implementing sustainability into a supply chain and the opposing views of its successfulness these type of sources are accurate for the purpose of this chapter.

4.2 Complexity

4.2.1 Company approaches on complexity

HP tries to meet the challenge of complexity in sustainability meaning and concept by dividing sustainability into three topics, people, planet and community, which are oriented

after the TBL understanding and by thereby formulating specific HP impact goals (HP, 2017, p. 23). The people pillar can be compared to the social pillar and addresses global inequality from supply chain to employees and partners. The community pillar indicates the positive impact on the surrounding where business is done and the planet pillar can be compared to the environmental dimension and focuses on limited natural resources (HP, 2018). This shows that the company has tried to make the topic its own which can be viewed positively. HP has a very complex supply chain and every minute HP delivers to customers' worldwide around 76 printers, 103 PCs and 640 supplies, which gives an impression of the quantities within the supply chain. HP recognizes, the more products a company produces and the more sophisticated a product is the more complex is its supply chain (HP, 2017, p. 38). In regard to conflict minerals HP views any connections between the conflict and the company unacceptable and states that they want to communicate openly about their challenges and acknowledge the complexity of this topic. In this instance HP refers to its highly complex multi-actor supply chain and underlines that it has the most impact on the direct suppliers and is therefore just limited in influence (Berg, 2012). Furthermore, the company claims to just use a very limited amount of those minerals and therefore does not have as much power as other parties that operate closely related to the minerals. It sees itself as an end user and postulates that HP is four to 10 supply chain stages away from the source (HP, 2017, p. 39). This is a perspective that can be viewed as indicator for not having a true holistic sustainable supply chain management in place.

Intel tries to meet the challenge of complexity in sustainability meaning and concept by understanding sustainability as "corporate responsibility" and wants to integrate it in all business activities (Intel, 2019, p. 5 ff.). Already providing an insight of its different more holistic understanding compared to HP. Intel's sustainability understanding leads also to the TBL but in contrast to HP, Intel provides detailed information in how sustainability topics are identified and how they are prioritized. Prioritization is based on impacts of stakeholder decisions and impact of Intel's business. Once those are found, they are classified as belonging to either the social, ecological or economic dimension (Intel, 2019, p. 21). This is a very good approach in identifying what sustainability can entail on company level and to meet the complexity challenge of determining sustainability. The sustainability focus postulated in the report however seems to be within the environmental dimension (Intel, 2019, p. 27 ff.). The SC of Intel is as complex as at HP having more than 11.000 suppliers in over 90 countries whereby 40% are in America, 27% in Europe Middle East and Africa combined and 29% in Asia Pacific (Intel, 2019, p. 40 ff.). Conflict minerals are of special importance for Intel and although the complexity of the issue is known, Intel wants to be an

active player, taking own initiative rather than just relating on industry partners' effort (The Guardian, 2014).

Umicore compared to HP and Intel is trying to meet the challenge of complexity in sustainability meaning and concept having sustainability as core for doing business. Umicore works with an integrative understanding of sustainability comparable to Intel and it views it as essential pillar for all business activities. In addition, Umicore puts special emphasize on minerals in their understanding of sustainability and claims that these minerals have a special role to play as they can be recycled which according to Umicore makes the basis for sustainability (Umicore, 2018, p. 25). Umicore has a very sophisticated and variable product and service portfolio operating through three business groups on five continents having over 18,000 suppliers worldwide leading to a complex supply chain (Umicore, 2019, p. 63). Furthermore, conflict mineral related complexities are acknowledged but nevertheless, Umicore's aim is to assure that conflict minerals do not enter the supply chain. Moreover, there is an awareness that the business operations are extremely connected to conflict minerals and therefore, Umicore wants to face the complexities (Umicore, 2018, p. 26)

Fairphone is devoted to a conflict mineral related sustainability understanding and therefore acknowledges a holistic sustainability understanding as well as the complexity of the supply chain and conflict minerals (Mirbach, 2014). Fairphone as only company example that just offers one single product illustrates that even though the product portfolio is limited, complexities are still considerable (Fairphone, 2016). Smartphones require several different components, which are derived from different suppliers that also source their materials worldwide what indicates a sophisticated international supply chain network of mines, smelters different tiers of manufacturers and refiners (Fairphone, 2018, p. 4). Having this in mind this also gives an impression of the high complexities of the other companies that have a bigger product portfolio.

4.2.2 Recommendations on complexity

First of all, what the company examples illustrate is how the complexity in sustainability meaning and concept leads to different perceptions on what it entails on company level for their supply chain but all of the companies differentiate areas of relevance according to the TBL. The idea of HP in formulating its own definition of sustainability can be recommended in order to gain deeper understanding of the concept and its adaptability implications when it is combined with a proactive and integrative approach as Intel and Umicore follow. However, it is deeply advised that sustainability at the end needs to be understood as holistic concept as postulated in 3.1.1 and the supply chain management needs to have this understanding in order to be able to meet the challenge of sustainability in global supply chains. Furthermore, the examples showed how the companies are facing different degrees of SC complexities

based on the size of the portfolio but generally, it is important to view complexity not as problem or excuses for not being able to take action and to just rely on partners but rather to acknowledge complexity as part of supply chain management. That means for the complex nature of the supply chain but also for the conflict mineral issue, it is important to have awareness on management level about the correlations and interdependencies. All companies did claim to consider conflict minerals but considering the sophisticated supply chain of conflict minerals all four companies lack - including Umicore and Fairphone – to have targeted complexity management in the supply chain that works on mastering the complexity. To have a targeted complexity management is therefore recommended and entails to first understand the source of complexity and to determine which elements add value and which don't. The aim should be to eliminate the non-value adding complexity and to minimize the cost for the value adding complexity and to finally continuously to monitor costs and benefits of the complexities (Christopher, 2016, p. 217). The challenge for supply chain managers is to understand the value that customers seek and to find ways to deliver that value with least complexity and in terms of sustainability in the complex supply chain, this is a highly sophisticated task (Christopher, 2016, p. 218). Complexity management in the supply chain has to be a careful balance between over- simplification on the one hand and a focus on cost and efficiency on the other. The aim should be to reduce or eliminate any complexity that does not add value to the customer or that does not protect against supply chain risk. Especially when considering the high complexities of conflict mineral supply chains this could be helpful to meet the challenge.

4.3 Conformity and implementation

4.3.1 Company approaches on conformity and implementation

For implementing sustainability in the SC, HP chooses to conform on building a stronger closed loop supply chain, which is ethical and resilient (HP, 2017, p. 10). That means to recycle hardware and thereby close the supply chain. Although recycling as such is favorable in terms of the ecological dimension in terms of conflict minerals, it needs to be underlined again that it is a controversial topic but it seems as if HP is aware and knows that this approach does not suffice in order to implement sustainability holistically although they postulated distance. Thus, they work with promoting best practices aligning with formulated SC Principles that cover supply chain environmental impact and supply chain responsibility topics such as labor, health and environmental aspects (HP, 2017, p. 28). For conflict minerals that means to improve and strengthen the conditions of the people who make the products and to consider the communities where the workers live (HP, 2017, p. 14). In order to ensure this as common understanding the participants can conform to, HP also works with communication and encouragement of smelters that purchase and process need to be

audited by independent third- parties (HP, 2017, p. 46). It can be argued weather encouragement is enough and HP in that sense is not as involved as the other companies investigated. In addition, HP urges production suppliers of electronic goods containing 3TG to require their smelters to commit to third-party sourcing audits and to support multi-stakeholder collaborations to establish conflict-free sourcing of 3TG (HP, 2017, p. 47). Furthermore, conformity and implementation are tried to be established by setting up clear expectations through a Supply Chain Social and Environmental Responsibility Policy, General Specification for the Environment and Supplier Code of Conduct (HP, 2018, p. 1). For conflict minerals the HP supplier code of conduct and the HP supply chain social and environmental responsibility policy play major roles where it clearly demands the suppliers to understand the issues and policies that are needed to meet the issue. In addition, each supplier needs to take responsibility for their suppliers in regard of aligning with the policies (HP, 2017, p. 1). This again is a rather passive approach compared to the other companies. The first tier suppliers however are assessed based on a common reporting templates in order to assure comparison (HP, 2018, p. 47). Furthermore, training is given upon request, which can be viewed as critical because HP is not actively enhancing it. The supplier is removed if no improvement is visible (HP, 2018, p. 48).

Conformity and implementation at Intel look differently than at HP. Although there is an awareness of the TBL, the focus postulated is within the environmental dimension but what is interesting is that it does not play the main role in implementing sustainability in the supply chain and neither in how conflict minerals are approached. This shows the adaptability of sustainability when understanding it holistically. Intel is a great example of implementing sustainability in the SC in a holistic manner by establishing a common ground and understanding based on high internal and external standards on multitier-level through code of conducts and responsible business codes that address social, environmental and ethical standards (Intel, 2019, p. 40). Concerning conflict minerals, Intel broke its implementation further down into actively enhancing common understanding through communication with all major SC participants, assessment of them and capability building programs to encourage conformity and implementation towards responsible sourcing (Intel, 2019, p. 39). Intel expects all suppliers to develop their own strategies to ensure conformity and communicates this directly (Intel, 2019, p. 40). This approach can be viewed positively as it doesn't leave room for misinterpretation but in contrast to HP, Intel states to proactively help the SC participants to meet the expectations and even cases of donations in order to enable implementation has been found (Kaufman, 2016). This also is a good insight that sustainability can be managed just when all participants are able to take their responsibility and a proactive attitude is in place. An additional interesting implementation approach Intel uses is the Supplier Report Card – short SRC- which helps the company to grade the

supplier for product availability, cost, quality, technology, and customer satisfaction but also sustainability which is evaluated based on ethics, financial sustainability, supplier diversity, and environmental and human rights performance (Intel, 2019, p. 41). This can be viewed as helpful implementation tool to gain an insight, assure conformity and to document progress.

Umicore also implements sustainability through conforming on a closed loop solution. Moreover, the heart of its sustainability implementation lies in their business itself that focuses in closing the materials loop together with certified clean and ethical supply (Umicore, 2018, p. 1). Therefore, Umicore is engaged in a constant dialogue with its suppliers to ensure mutual acceptance and understanding in terms and conditions for continued partnerships as well as to determine technical specifications aligning with their sustainability approach. Umicore has a long term perspective on sustainability and its roots can be traced back from the 18th century and is therefore advocating better practices by using their long-standing and growing experience in ethical sourcing and sustainably managing raw materials (Umicore, 2018, p. 25). Nevertheless, Umicore was involved in a fraudulent gold labeling scandal in 2011 what has led to high criticism with significant implementation improvements as consequence (Köhler, 2011). As customers increasingly request guarantees to be conflict free, Umicore tries to enhance implementation and conformity through policies and charters such as the Umicore Code of Conduct, Human Rights Policy and Sustainable Procurement Charter and a specific policy for high risk areas. Thus, policies and measures are used that cover human rights, the right for workers to organize, collective bargaining, equal opportunities and non-discrimination, banning of child labor, banning of forced labor, consistent with International standards. Umicore is using an integrated approach to sustainability through its company division into three groups that are catalysis, energy and surface technologies and lastly recycling, which particularly enable to practice sustainability as closed loop supply chain (Umicore, 2018, p. 2). All three groups do have connection to conflict minerals. Umicore seems to be aware that closed loop solutions are not enough and follows a TBL understanding of implementing sustainability in the SC. Thus, for Umicore to have a value chain with a sustainable supply means to provide environmental and ethical sourcing benefits for comparatively scarce raw materials and to foster thereby sustainable success and growth, (Umicore, 2018, p. 5). This made Umicore so far the first and only cathode material producer that is able to offer certified materials from a clean and ethical origin to customers in the rechargeable battery value chain. On the one hand this shows how difficult it is and on the other hand it speaks for Umicore's excellence and the meaning of long term efforts (Umicore, 2018, p. 8). Furthermore, individual business units are responsible for the purchase of raw materials, while the corporate transportation and purchasing department works to ensure that transportation, energy and other

provisioning needs are met (Umicore, 2018, p. 69). This distribution on the one hand can be viewed helpful because SCM has the opportunity to rely on the units taking their responsibility but on the other hand, it requires correct fulfillment. In order to achieve this, proceedings in each unit are shaped by the Sustainable Procurement Charter, which is complemented by specific frameworks for some critical raw materials (Umicore, 2018, p. 70). This entails a three steps approach which serves to identify the raw materials that are critical and which each business unit has to follow. The process consists of defining the criteria applicable to the raw material specific to the business units' activity, identification of the raw material with a high probability to restriction supply and calculation of the impact. This already shows how dependent implementation is on the business unit and SC stage as well as how detailed implementation can be. Furthermore, 21 supply criteria, that cover various aspects of sustainability, have been offered to the business units as input for identification. This can be viewed highly positive to assure that all relevant topics are evaluated. The criteria can then be clustered in themes such as regulatory aspects of the raw material, concentration in the market, restrictions in the country of origin , Ethical aspects and potential conflicts with the code of conduct (Umicore, 2018, p. 180). Another important factor for implementation is Umicore's so-called „Horizon 2020 strategy“ that tries to include an objective on sustainable supply that builds on the experience gained through their previous sustainability objectives (Umicore, 2018, p. 63). This can be viewed as valuable implementation method because lessons learned from previous attempts are directly and intentionally used. As a consequence of its recyclability and potential to close the loop, recycled input materials use, resource scarcity, supplier screening, supply disruptions, sustainability of supply chain/responsible sourcing as main material topics Umicore attained a unique position in clean mobility materials and in recycling (Umicore, 2018, p. 70). Through additionally considering economic, environmental and social performance of their suppliers, and the social and environmental impact of the supply in the purchase of materials it is an effective enabler in terms of having a holistic perspective and considering all variables including external ones such as consequences for the surrounding. Umicore tries to ensure that procurement of minerals from conflict-affected and high-risk areas is in line with Umicore's values, while providing an advantage to their customers (Umicore, 2018, p. 45). Through the closed loop, Umicore approaches the chain upstream with suppliers and downstream with customers (Umicore, 2018, p. 25) Upstream, there is high emphasis on the management of key raw materials supply requirements which assures a clear conflict mineral orientation (Umicore, 2018, p. 26).

Fairphone as last example is especially interesting due to its public well-known conflict mineral commitment (Költzsch, 2014). Having fairness, openness and inclusivity as core values targeting to build an overall understanding that technology is an instrument of social change, Fairphone

started as a campaign to raise awareness about conflict minerals in consumer electronics (Fairphone, 2017, p. 14). After three years of working through, this campaign and through related research; Fairphone was officially established as a social enterprise (Fairphone, 2016). This is a key implementation indicator because conflict mineral related sustainability in the SC is a core idea of the company what establishes a deeper level of understanding from the ground up so that the sustainability understanding for SC did not have to be narrowed down but could be implemented right away from the beginning. As a social enterprise the main aim is to achieve an improvement of general social well being (Diochon , 2008, S. 11). For Fairphone's SC this practically means to employ commercial strategies to enable social and environmental improvements, which speaks for a holistic understanding. Fairphone's supply chain focuses on four key issues, which are mining, design, manufacturing and life cycle (Fairphone, 2016, p. 1). Mining addresses how to source materials that will support local economies and not armed militias while the company starts with conflict free minerals from the DRC (Fairphone, 2017, p. 56). The design enables a long lasting and repairable product and manufacturing is done under fair and safe conditions (Fairphone, 2017, pp. 38, 76). The lifecycle considers the entire lifespan of a mobile phone including safe recycling, use and reuse (Fairphone, 2017, p. 88). That means Fairphone also works with academically proposed sustainable supply chain solutions such as recycling but did understand that in terms of conflict minerals a holistic sustainability view is needed and other measures are required to move towards a sustainable supply chain. In this instance, striving for long-term collaboration with suppliers has become crucial in conforming on and implementing sustainability into the supply chain (Fairphone, 2018, p. 7). Thus, to get suppliers involved in the mission and to make sure that there is a common understanding of the subject matter to increase and assess responsible business practices. For Fairphone, that also includes setting clear expectations about policies and operational practices through a code of conduct that covers all the relevant topics such as commitments and standards in labor and human rights, health and safety, environment and business ethics in order to build a common ground to manage sustainability in supply chain (Fairphone, 2017, S. 2ff.). Furthermore, the high level of seeking improvement opportunities is outstanding in regard of working with suppliers. For Fairphone it means not just to select manufacturers carefully and to build relationships with them but also to initiate improvement programs that address a wide range of issues that also go beyond the own supply chain and involves industry experts and governments (Fairphone, 2018, p. 6). Fairphone admits that these aims are ambitious, puts repeated emphases on not being able to unleash the entire supply chain at once and that sustainability cannot fully be achieved yet, but it is work in progress. Moreover, Fairphone uses it as chance to take a step-by-step approach of mapping combined with direct communication with suppliers and desk research in order to give the room for a tailored implementation and conformity (Fairphone, 2018, p. 6). To have such openness in how far implementation and

conformity goes can be viewed positively as it shows that the company does not have something to hide.

4.3.2 Recommendations on conformity and implementation

As theory and practice solutions on conformity and implementation deviate, the company examples underline the dependency on the nature of a company. While Umicore's core business lies within closing the loop and Fairphone's business is heavily focusing on conflict mineral related issues, Intel and HP have to embed sustainability solutions on top. Thus, it can be derived that solutions should always consider the nature of the business and how to implement sustainability must be suitable for the specific business and should therefore be critically evaluated and is also a matter of determination of sustainability on company level, which was discussed in the previous chapter. However, it underlines the interconnectedness of the different challenges and the recommendations. Furthermore, it can be derived that closed loop solutions do not suffice but they can be stepping-stones as long as the SCM is taking a holistic sustainability scope into account. In addition, the time factor should not be underestimated. First of all, implementation should be understood as long term process what needs time and a proactive attitude and as Umicore showed long term orientation can lead to an advantage as expertise can be gained but scandals can still happen. Evaluating HP and Intel in contrast to Umicore and Fairphone, it can be derived that the more sustainability is incorporated in the DNA of a company the higher the level of understanding has to be. Moreover, to assure that each SC participant has the same understanding of sustainability is key and all companies investigated try to assure this by communicating clear expectations on multitier level and by formulating high internal and external standards, policies and codes of conducts. This can be recommended but suppliers should be involved and not left alone in responsibility but rather proactively enhanced through trainings to contribute towards sustainability. Policies should be continuously revised based on previous lesson learned.

4.4 Regulations and frameworks

4.4.1 Company approaches on regulations and frameworks

Although the OECD Guidelines for multinational Enterprises as well as the SDG are both intended to provide directions and simplify conformity for companies it is conspicuous, that companies mainly refer directly to the SDG in their reports and on their website. This already shows that even though regulation frameworks exist and have valuable intentions, companies have a clear tendency towards applying the SDG. For more specificity concerning conflict minerals the investigated companies either use the Dodd Frank or the EU Guidelines or both.

HP commits to seven SDGs that are related to their sustainability understanding of planet, people and community (HP, 2018). Furthermore, HP works with the Dodd Frank Act and the UN Guiding Principles on Business and Human Rights for companies' due diligence and complies with additional frameworks such as the UK Modern Slavery Act and the California Transparency in Supply Chains (HP, 2017, p. 39). Although HP's operations are not in the official scope of the new EU conflict minerals regulations, HP decided to align the policies and approach to the extent practicable and thereby prepares to support their customers' requirements consistent with the regulation (HP, 2017, p. 48). This is an outstanding commitment and shows a foresighted perspective of the SCM.

Intel is committed to seven SDGs that cover environmental responsibility, diversity and inclusion and social impact. Different than HP and although the SDGs are not SC specific Intel assigned two out of the seven SDGs to supply chain responsibility which are promoting inclusive and sustainable economic growth, employment, and decent work for all (SDG 8) and ensuring sustainable consumption and production patterns (SDG 12) (Intel, 2019, p. 24). In regard to conflict minerals, according to Intel, the industry mainly focuses on Section 1502 of the Dodd Frank Act, which the company views as not sufficient (Intel, 2019, p. 1). Due to the increased concerns about additional human right violations that go beyond the scope of Section 1502 Dodd Frank Act Intel therefore established its own framework, which is in Alignment with the OECD Due Diligence guidance. This is an outstanding effort that shows that the company is really trying to contribute positively towards the conflict and to achieve true sustainability.

Umicore is viewing the increase in existing and upcoming laws that aim to drive the responsible sourcing of conflict minerals positively and appraises the improved visibility and concern on the conditions around conflict mineral sourcing in public discourse as benefit for the industry (Umicore, 2018, p. 45). Umicore also devoted to the SDG and uses six SDGS whereby Umicore also assigned two to supply chain, which are decent work and economic growth as well as responsible consumption and production (Umicore, 2018, p. 4). Umicore already uses the Dodd Frank Act but also announces to adapt the new EU regulation even though the regulation does not address Umicore's business operation such as recycling entirely, what can be underlined in terms of having an understanding of the importance of EU wider conformity on conflict mineral (Umicore, 2018, p. 181).

It is surprising that Fairphone does not directly refer to the sustainable development goals but due to its overall understanding in being a social enterprise they work with their own frameworks aligned with the OECD and established a responsible sourcing policy that is beyond the scope of the Dodd Frank Act and EU guideline (Fairphone, 2018, p. 18).

4.2.4 Recommendations on regulations and frameworks

It is interesting to note that although the SDGs are not directly meant for the SC that two out of four companies still choose to assign the goals directly to the SC. This shows how much the SDG are valued. However, when working with regulations and frameworks, supply chain management has to have an understanding that the OECD guidelines and the SDG are general guidelines for sustainability but not in particular targeted for the supply chain. Therefore, it is recommended that additional regulations and framework such as Dodd Frank and EU Guidelines related to the topic in question need to be considered. Furthermore, it is to underline that when using regulations and frameworks, each regulation and each framework do have their limitations and serve as guidelines only. For example when working with frameworks that lists high risk areas, that means that when a country is absent from the list, this does not automatically mean that there is no risk in that area (Global Witness, 2010). In addition SDG related sustainability understanding in one country is not equal to the understanding in the other country (Global Witness, 2015). Therefore, it is highly recommended that importers should be proactive and assess a wide range of information on their supply chain in accordance with the standards in use. However, they should always be aware that regulations and frameworks are no exhaustive and not binding (Global Witness, 2010). Thus, companies should also include research reports from governments, international organizations, civil society and industry and SCM needs to view the use of regulations and frameworks as an ongoing process with a wider scope. This also indicates that there has to be a stable government that is able to provide this information and a stable frame where guidance can be implemented (van Opijnen & Oldenziel , 2011). This is already not the case for the DRC. Establishing own frameworks that go beyond the scope of regulations are recommended. However, it should be considered that implementing frameworks have to be done in cooperation with all supply chain participants and that it requires serious effort and resources in order to be successful.

4.5 Transparency through due diligence

4.5.1 Company approaches on transparency through due diligence

All four companies investigated work on making the supply chain more transparent in order to achieve sustainability and they try to develop procedures in line with the OECD Due Diligence Guidelines.

HP follows the OECD Due Diligence Guidelines and refers to the five steps approach to achieve transparency. As first step, HP wants to have and encourage suppliers to develop robust management systems to address issues by offering coaching, specialized training upon request and by data collection and direct communication (HP, 2017, p. 53). As second step, risk is assessed by using supplier lists that make up 95% of the production supplier

spend every year and they analyze their geography, type of manufacturing, and also use - as suggested by the OECD - external information sources such as news and NGO reports to determine which suppliers require an on-site audit (HP, 2018, p. 53). Nevertheless, HP's third step, focuses on achieving Due Diligence through a rather collaborative approach in line with their understanding towards conflict minerals (HP, 2017, S. 5). Based on the idea that sourcing minerals responsibly requires global coordinated efforts across sectors and industries, HP states to heavily work with multistakeholder initiatives. Thus, HP works with businesses, nongovernmental organizations, government agencies, and production suppliers to make progress in responsibly sourced minerals. This also results in working with the RMI and in forums, where HP helps to develop and share trainings, templates, and white papers to build the capabilities of the IT industry and beyond (HP, 2018, p. 48). As fourth step, HP works also with audits and certificates in order to measure conformance and to help to leverage improvements in suppliers' social and environmental performance but states that it is difficult due to the infrastructure of the home country (Heath, 2014). Additionally, HP supports its due diligence with the sustainability scorecard using it as transparency tool , which provides suppliers a score that encompasses audit performance (60% of total score), environmental reporting (13%), conflict minerals disclosure (6%), and other social and environmental topics (21%) (HP, 2018, p. 53). This can be viewed positively as it shows how the company individualizes its due diligence process. In case a breach is found a corrective action plan addressing all identified non-conformance has to be formulated within 30 days of receipt of the site audit report. If the progresses do not suffice HP offers to help. HP takes harmful non-conformance very seriously (HP, 2017, p. 55). HP also provides publicly accessible information on their website and concluded that their supply chain is not conflict free yet but the longer the supplier is committed, the higher the level of engagement towards this goal (HP, 2018, p. 54). Nevertheless, conflict free is not achieved and HP is still recognized as having a leading conflict mineral supply chain approach (Callaway, 2017).

For Intel, due diligence is of high importance as they suggest making it mandatory to the entire industry (Intel, 2019, p. 46). Intel's current due diligence practices are highly aligned with the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas and the Five-Steps Approach is followed. The focus is on the second step, thus Identification and Mitigation of Risk (Intel, 2019, p. 42).

In terms of the first step, however a strong company management system is in place through clear policies underlined by the company. Intel positions itself clearly in regard to conflict minerals and makes efforts beyond 3TGs but rather for all minerals which clearly speaks for itself in having a wider perspective on the issue and what sustainability needs to consequently mean (Intel, 2019, p. 46). Additionally, Intel tries to clarify commitments to

human rights by supplier programs to accelerate responsibility and engagement as an umbrella under which Intel drives all supplier sustainability requirements. Furthermore, it serves as collaborative initiative to support the suppliers (Intel, 2019, p. 1).

In order to identify and assess risks as second step Intel works with long-term partnerships as well as collaborations and participates in initiatives such as the Responsible Minerals Initiative (Intel, 2019, p. 3). The importance of collaborations with other companies and actors in the industry in order to meet not just transparency but also overall challenges of sustainability is thereby underlined (United Nations Global Compact, 2019).

The assessments are based on more than 300 environmental, safety, and human rights factors, and help Intel to determine the profile of suppliers including identification of smelters and refiners that process Intel's metals, the country of origin and trade of minerals. In addition, a yearly conducted supply chain surveys aligning with the due diligence standards compliments the assessment (Intel, 2019, p. 44). By comparing these smelters and refiners with already conforming ones that were validated by the Responsible Mining Initiative, potential non-conformance can be identified (Intel, 2019, p. 46ff.).

When there is a potential risk further due diligence will be conducted which can also entail on site visits to help to identify risks at the source, encourage smelters and refiners to participate to validate their sourcing practices, and drive risk mitigation for human rights impacts which is part of their implementation strategy (Intel, 2019, p. 46). Thus, it is to underline that Intel understands due diligence also as supporting the region of sourcing in order to be able to implement due diligence. This is good approach because guidelines just work and fulfill their purpose where there is a stable infrastructure. Contributing towards it by local work and encouragement shows that Intel's SCM does have a holistic perspective (Intel, 2019, p. 46). In those cases where responsible minerals sourcing standards cannot be uphold and breaches are found, the party will disengage from mineral supply chains (Intel, 2019, p. 46).

Furthermore, Intel is conducting audits by following leading standards for onsite compliance verification and effective, shareable audits which is a good benchmark that tries to promise high quality but as the Vale Case has shown there is always danger of bias. In case something undesirable is detected through the audits Intel works with Targeted Action Plans that are reviewed quarterly to make sure that suppliers make sufficient progress in addressing the issue which is in line with the suggestions of the OECD (Intel, 2019, p. 43f.). Furthermore, Intel works with feedbacks and rewards in order to encourage the suppliers for good sustainability performance, which is a good management and implementation approach to give incentive and motivate the partners (Intel, 2019, p. 43).

Lastly Intel provides publicly assessable information on their website and as a result of due diligence and Intel's additional evaluations, Intel made the conclusion that their supply chain is entirely conflict mineral free (Intel, 2019, p. 47). This is a breakthrough for the entire industry and an outstanding achievement underlining the importance of resources of a company and the weight of experience. Nevertheless in terms of sustainability and the company's overall complexity, it shows that although one topic is fulfilled that it does not automatically mean that the entire supply chain can be seen as sustainable yet what underlines the sophisticated nature of sustainability in SC (Intel, 2019, p. 46).

Umicore tries to establish transparency through a due diligence policy on conflict minerals that is aligned with the OECD Guideline and the proposed five steps approach (Umicore, 2018, p. 26). However, Umicore puts more emphasize on due diligence beyond the scope of 3TG but states that procedures to 3TG can be comparable (Umicore, 2019) (Umicore, 2019, p. 27). Leading to a due diligence process that consists of a suppliers' traceability system, suppliers research, risk assessment and risk mitigation (Hagelücken, 2019). Suppliers traceability is supported through clear policies, the use of certificates and working with internal groups and Initiatives such as the RMI that streamlines and optimizes the efforts required for this growing customer demand through best practices sharing (Umicore, 2019, p. 181). Furthermore, information from initiatives and working groups can help for supplier's research contributing to supplier's background check (Hagelücken, 2019). Risk assessment consists of OCED oriented checking of red flags, self-assessment questionnaires and plant visits to identify and assess potential risks (Umicore, 2018, p. 181). Independent 3rd party audits are carried out and plans postulated in order to mitigate risk (Umicore, 2018, p. 26). Information are publicly provided on the company website and due diligence concluded that, their gold supply chain is conflict free (Umicore, 2018, p. 181)

Fairphone strives to go beyond compliance, audits and assessments in order to achieve transparency and uses the OECD due diligence as tool to realize their SC goals. On the one hand it means active identification of suppliers that share the same values but also engagement and internalizing improvements. Every action is being done with the sustainability vision and aim in mind, striving for a deeper understanding and a united mindset throughout every stage of the supply chain (Fairphone, 2018, p. 3). This also shows that each supplier and each workplace requires an an individual approach to create a sustainable impact. Thus, refiners and smelters are crucial in Fairphone's supply chain. In order to identify which refiners and smelters are part of the supply chain, Fairphone uses a top down approach within the due diligence. Thus, Fairphone monitors its supply chain in accordance with the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas and uses the proposed five steps approach and provides openly details how they manage each step.

For the first step, Fairphone does have a responsible sourcing policy that outlines shared commitments with partners and suppliers to make a positive impact. Specifications in how information about the supply chain are collected as well as legal regulations and details about the value chain and product teams are set in a Standard Operating Procedure for Mineral Due Diligence (Fairphone, 2018, p. 18).

The second step that consist of identifying and assessing risk is based on the information provided by suppliers, smelters and refiners that are related to 4 TGs. In addition material declarations are collected in order to understand which components contain the 4 TGs. 97% of the suppliers that have been contacted, provided information on the tin, tungsten, tantalum and gold (Fairphone, 2018, p. 19). 50 % of these suppliers reported on a clear product level whereas the others reported on a company level or a mix which led to impreciseness. Thus making it difficult to really validate if the correct supply chain connections have been reported. This clarifies why it makes sense to work bottom up to achieve real transparency and underlines the importance of working on the source. Suppliers are asked to cascade a conflict mineral report and this information will be further evaluated with the Responsible Minerals Assurance Process (RMAP). A verification to RMAP assures that smelters and refiners within the supply chain embed responsible sourcing practices and management systems (SCS Global Services, 2018)

For the third step, in case something undesirable is found Fairphone conducts further research and tries to achieve clarification through dialogues which can result in the termination of the relationship in the last instance or towards a collaborative approach towards an improvement in planning (Fairphone, 2018, p. 18).

Due to the size and available resources of Fairphone, the company does not conduct separate independent audits as fourth step of the due diligence but relies on the status of smelters that have been given by industry wide programs like the Responsible Minerals Initiative (Fairphone, 2018, p. 19).

The outcome of these investigations are regularly published and updated through a list of suppliers, smelters and refiners which stays in accordance with the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas.

4.5.2 Recommendations on transparency through due diligence

As the companies all follow due diligence in accordance with the OECD Due Diligence guidelines, this approach can generally be recommended in order to achieve transparency. However, it can just be a success factor, when the SCM is implementing it with a holistic sustainability understanding. That means in terms of using the five steps approach a wider range of information should be derived. Furthermore, it should be understood as an ongoing proactive process where human failure in audits and certificates in view of the conflict mineral supply chain should be acknowledged. Overall, good faith efforts should be taken and detailed and comprehensible information on the due diligence result should be published (van Opijnen & Oldenziel , 2011). Furthermore, based on the company approaches it can be said that risks can arise at new places at any time and due diligence processes should therefore be built into existing management systems. That means when SCM understand their own supply chains and business partners entirely, they are better placed to identify and deal with risks more effective and faster in contrast to when implementing something entirely new underlining the benefit of long-term experience. Thus, due diligence leaves room for learning and progress over time. Therefore companies should proactively test and improve their management systems as they develop a deeper understanding of their supply chains. Additionally, in order to meet the challenge with due diligence it should be kept in mind that it is not demanded to have conflict free and thereby to ban the minerals but rather to focus on being honest and transparent in how these challenges are faced. Focus should be how the material is being sourced and not from what country. Furthermore, as all companies investigated have their own approach, due diligence is not a one size fits all process what means companies are highly recommended to tailor their efforts to their individual circumstances and country. Thus, sustainability and the connecting due diligence measures for one country are not necessarily suitable and directly applicable for another country. Collective efforts are important, but they are often focusing on general problems rather than on issues in the own supply chain what should be considered. Company level due diligence should therefore assure that companies take ownership and use their access to key parties involved (Global Witness, 2010, p. 8).

5 Conclusion

SCs are a central element for business operations and need sophisticated management that is capable to face challenges in global supply chains. Conflict minerals play a special role in the current era of digitalization and serve as good example to approach sustainability in SC. As being extremely relevant for industries that operate with those resources, in particular companies in the tech and innovative industry that want to embed sustainability need to cope with complexities. Having a holistic understanding of sustainability and an awareness of the

multitier complexity is of high importance. Furthermore, conformity and implementation can be established through building a common understanding through clear communication but also through collaboratively established code of conducts and policies. The existence of regulations and frameworks such as OECD guidelines or SDGs can be supportive as they give a first start for orientation but as they are not all legally binding on international level, implementation remains challenging and there is not a level playing field. Context specific guidelines such as the Dodd Frank Act give more specificities and development can also be observed in the EU through the EU guidelines that will come into effect. In addition, transparency is tried to be established through due diligence practices in combination with working with initiatives, schemes and certificates what has been found difficult due to the high risk of human failure. The company examples have shown that there is effort involved in order to meet the challenges but it is important to approach the issue in order to see improvement and achieve sustainability. As answer for the research question of this thesis “Despite challenges of sustainability in supply chains, how can sustainability be accomplished in global SCs?”, it can be postulated that despite the challenges of sustainability in supply chains, it can be accomplished when there is a holistic sustainable supply chain management that considers complexity and recognizes measurable criteria of sustainability in its entity. This provides valuable insights for supply chain practitioners that want to achieve sustainability. In order to meet the challenge of complexity this is key and broadens the perspective to understand the supply chain and the conflict mineral issue taking into account the whole supply chain network as well as environmental, economic and social considerations. Furthermore, it enables to establish conformity in favor of all participants and facilitates implementation that considers a wider scope. The same holds true for regulations and frameworks. As they are not exhaustive, to have a holistic understanding leads to the automatic need of considering aspects that are beyond the legal proposals. In addition, transparency related suggestions of the OECD would then be evaluated based on a holistic understanding.

As critical acclaim, it needs to be taken into account that supply chain complexities postulated in the thesis are highly simplified. Due to the nature of global supply chains, cultural factors can also play a role and was not covered in the thesis. Furthermore, the supply chain challenges presented in this thesis and the recommendations derived from the four companies are not exhaustive but rather a good start to work with for further research.

For the future it can be predicted that complexities will rise but leveraging the need of having a more holistic perspective on sustainability in SCM. Thus, as digitalization goes on, the need for conflict minerals will also increase but also other minerals such as cobalt will be in

the scope. As far as implementation goes, a sustainable supply chain management will be increasingly important and trends can already be seen through regulations such as the SDG and development on EU level. Transparency related due diligence will have to improve and issues need to be addressed at the source. All in all due to the increasing demand for sustainability by stakeholders and the severe need, it can be predicted that sustainable supply chain management will be increasingly acknowledged. For future studies it can therefore be recommended to investigate a wider scope of practice examples in context of a holistic sustainable supply chain understanding in order to find more applicable solutions that can be realized but also to narrow the gap of literature-based sustainability solutions and practice.

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V. Declaration of originality

I hereby declare that this bachelor thesis and the work reported herein was composed by and originated entirely from me. Information derived from published and unpublished work of others has been acknowledged in the text and references are given in the list of references.

Hamburg, August 15th 2019



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