Heart of Brightness

Diamonds, Technology and Desire

Master's Thesis

Francesco Oliviero Caccioni (114956)

Stefan Kiessling (116123)

Study program: M.Sc. in Business Administration & Philosophy, Copenhagen Business School

Department: Department of Management, Politics and Philosophy

Supervisor: Professor Ole Bjerg

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Abstract

This thesis provides an overview about Sierra Leone's artisanal diamond value chain. We will evaluate the country's implementation of the Kimberley Process Certification Scheme, the current global governance framework for the trading of diamonds. We will proceed with an analysis of the artisanal diamond sector in Sierra Leone, especially the legal framework that is governing the chain, the different actors that are involved in it, and the various ways in which these are connected. Next, we will explore the value composition of diamonds. For this, we will compare the composition and usage of synthetic and natural diamonds. We will argue that the value of diamonds cannot be explained with traditional economic theory and is, ultimately, driven to a considerable part by fantasy. In a next step, we will argue that this ability to generate fantasies is also driving the various actors in the value chain and is influencing the way they construct their social life-worlds. Following this, we will put forward the thesis that transparency, in its current usage, is a fantasy constructed as a 'fix' to the inherent limitations of the current governance framework, the Kimberley Process. We will show that much of the current discourse about technology in the sector is inspired by an idea of transparency as traceability. Finally, we will conclude this thesis with our own proposal for a technical intervention that goes beyond the current paradigm of transparency as traceability. For this, we will evaluate blockchain technology. We will give a conceptual overview of the technology, from its beginning to its potential as a general-purpose, decentralized consensus mechanism. We will end with a proposal on how it may be used in the specific case of artisanal diamond mining in Sierra Leone.

Key words: Sierra Leone, Diamonds, Blockchain Technology, Governance, Transparency, Artisanal Mining, Slavoj Žižek.

Introduction

It is only a coincidence, obviously, but many people may have read it as a singular twist of fate, a cosmic joke with diamonds at the centre stage. It was the beginning of June 2007 when the former Liberian president and strongman Charles G. Taylor went on trial in the Hague for war crimes in the Sierra Leonean civil war, in which diamond smuggling played a major role. Among other offences, he was charged with having exchanged weapons for diamonds with rebel troops during the war and then channelled the precious stones in the international market (Le Billon, 2014). In that same days, the British artist Damien Hirst showed for the first time his new piece of art: a platinum human skull covered in 8601 diamonds, offered for £50 million. Called by the artist 'For

the Love of God', the skull is "entirely covered with small diamonds, including the nostrils, while one mega-diamond, weighing 52.40 carats, sits on its forehead" (Riding, 2007). The gallery explained that this artwork refers to the tradition of the *memento mori*, 'remember you are mortal', and explores "the fundamental themes of human existence — life, death, truth, love, immortality and art itself" (ibid.).

Many journalists observed that the cost of production (£12 million) was much lower than the final price - in the end, in the game of the art fairs, "the price tag is the art" (ibid.). But, regardless of the frenzy determining the price, one question remains: why did the artist choose diamonds for creating the quintessence of luxury and sublime expression of death? What would drive oligarchs and hedge-fund billionaires to invest so much in these stones covering human bones? One could pose a similar question to the man spending a three-months' salary on buying a diamond ring for his fiancée.

This desire for diamonds is not a prerogative of Western consumers. The precious stone fuels the dreams of immense wealth, or simply of a better future, for hundreds of thousands of Sierra Leonean miners. The stories about the first diamond rushes are ingrained into the cultural memory of the country and the gem is nowadays a symbol of identification for many communities. When walking on the streets of Koidu, the main city of the mining region, this becomes abundantly clear: the posters attached to the walls advertise the local football team, the *Diamond Stars*; on the corner of the street a restaurant with a big neon sign, the *Diamond Spot*.

Why are we so attracted to diamonds? Many people grew up watching James Bond, who killed for diamonds in one of the series' movies, and listened to Marilyn Monroe, who was suggesting men to buy a diamond as a present for their loved ones in her song *Diamonds Are a Girl's Best Friend*. On the other hand, consumers are mostly aware that mining communities are often exploited by international companies but they rarely choose to buy an artificial, and more ethical, version. The desire for a natural diamond cannot simply be substituted.

This thesis presents an expansion on these questions. As our subtitle "Diamonds, Technology and Desire" suggests, this thesis is an investigation of diamonds. Our research goal is to assess how and why diamonds are perceived as valuable, how they influence and determine their sociocultural surroundings, and how they gave birth to one of the most elaborate global governance structures of any commodity. As the diamonds are placed at the conjunction of value, desire, and control, they have also become a target for technological intervention. Our research question is

thus: how are diamonds desirable for consumers, suppliers, and non-governmental organizations (NGOs), and how can blockchain technology open up new spaces in its governance?

This thesis was done in collaboration with the NGO Oxfam IBIS in Copenhagen, who supported us and introduced us to the specific context of artisanal diamond mining in Sierra Leone[1]. Consequently, our research will focus on the specific case of artisanal diamond mining in Sierra Leone. We have, for several reasons, decided to focus our investigation on the artisanal mining sector and largely forgo the industrial mining sector. Apart from difficulties regarding access to industrial mining sites, a lot more citizens are engaged in, or dependent on, the artisanal diamond sector (Fanthorpe and Gabelle, 2013). While industrial mining is increasingly on the rise in Sierra Leone, estimations suggest that around three hundred thousand people are either directly or indirectly depending on the artisanal diamond sector for their income, compared to only around fourteen thousand who are engaged in industrial mining (Fanthorpe and Gabelle, 2013). Thus, it has arguably a much larger impact on the everyday social life of the population of Sierra Leone and their culture, which, in our opinion, makes it more attractive for a philosophical analysis.

We will begin our thesis with an overview about Sierra Leone's history, including the history of diamond mining in the country. This section will conclude with a description of the brutal civil war that tore the country apart. We will outline how this civil war became one of the main causes for the implementation of the current global governance framework regulating the trade of diamonds, namely the Kimberley Process Certification Scheme. We will proceed with an overview of the artisanal diamond value chain in Sierra Leone, especially the legal framework that is governing the chain, the different actors that are involved in it, and the various ways in which these are connected. Next, we will describe the value composition of diamonds, exemplified in the case of Sierra Leone. For this, we will compare the composition and usage of synthetic and natural diamonds. We will argue that the value of diamonds cannot be explained with traditional economic theory and is, ultimately, driven to a considerable part by fantasy. In a next step, we will argue that this ability to generate fantasies is also driving the various actors in the value chain and is influencing the way they construct their social life-worlds. Following this, we will have a closer look on the concept of transparency. As we will see, transparency is currently mostly discussed as a way to trace diamonds. We will put forward the thesis that transparency, in its current usage, is a fantasy constructed as a 'fix' to the inherent limitations of the current governance framework, the

[1] A copy of the contract of collaboration can be found in the Appendix.

Kimberley Process. We will then show that much of the current discourse about technology in the sector is inspired by this idea of transparency. True to Marx's statement that "[t]he philosophers have only *interpreted* the world differently, what matters, however, is to *change* it" (Marx et al., 1990, p. 7 emphasis in original), we will not stop at a critique of current proposals. On the contrary, we will conclude this thesis with our own proposal for a technical intervention that goes beyond the current paradigm of transparency as traceability. For this, we will evaluate one specific technology, namely blockchain technology. We will give a conceptual overview of the technology, from its beginning as a decentralized value transfer network, to a general-purpose, decentralized consensus mechanism, and end with a proposal on how it may be used in the specific case of artisanal diamond mining in Sierra Leone.

Methodology

As was mentioned earlier, this thesis was done in collaboration with Oxfam IBIS, and it includes fieldwork in Sierra Leone. However, despite our empirical research of the actors along the chain, our research methodology cannot be described with standard ethnographic or sociological frameworks. As Sverre Spoelstra points out: "organization studies tends to understand philosophy as the under-labourer for the social sciences [...] rather than [as] a positive force *within* organization studies" (Spoelstra, 2007, p. 16). From the beginning, it was our aim to operationalize philosophy in the given context as a positive force and not as a force to support existing ethnographic or sociological paradigms. Evaluating our method in terms of the relation between data and theory, it was, therefore, never our aim to validate a given social theory, nor to engage in theory building based on our empirical findings. We did not presuppose a theory of what the diamond is or how it is conceptualized. In this sense, we do not follow a "Grounded Theory" or "Extended Case Method" approach, for example (Tavory and Timmermans, 2009). Rather, we are interested in what Spoelstra calls "[t]he para-sense of philosophical concepts" (Spoelstra, 2007, p. 26). In this account, which is heavily inspired by Deleuze, philosophy as a positive methodology functions as a challenge or mirror to common-sense.

Our methodology is, therefore, not aimed at achieving social scientific validity, but rather at accessing the common-sense that prevails in the field. We attempted to achieve this through exemplary interaction with actors from within the field, especially for the reconstruction of the diamond value chain, and the way it is conceptualized. We then triangulated this with the study of

written accounts that describe the same sector and can, therefore, be counted as operating under the same common-sense. Consequently, our decision, which theory to apply in our analysis, was taken only after getting a feeling for the field. We were intentionally searching for puzzlements and paradoxes surrounding diamonds, in the sense that Spoelstra outlines as follows: "[p]aradox (from the Greek *paradoxon*) should be taken literally here: beyond (*para-*) opinion or common sense (*doxa*)" (Spoelstra, 2007, p. 26).

Like Spoelstra, we believe that paradoxes open the most fruitful venues for philosophical investigations and that "philosophy happens in confrontation with the actual". However, unlike Spoelstra we do not believe that "philosophical concepts, despite their practicality, cannot be put to practise in turn" (Spoelstra, 2007, p. 26). Therefore, instead of applying philosophical concepts to a common-sensical phenomenon, in order to create paradoxes, as Spoelstra is suggesting, we took the already existing, common-sensical paradoxes that we encountered in the field and its surrounding literature and, subsequently, applied philosophical concepts to them. The difference between our methodology and Spoelstra's can, thus, be summarized as a question of the respective aims. While Spoelstra believes that philosophical concepts create paradoxes to reframe narratives and only "touch upon the indeterminate and virtual" (Spoelstra, 2007, p. 29), we believe that they can actually explain and guide action upon already existing paradoxes that a philosopher can and should encounter in the field.

Before we can begin with such an analysis, however, it is important to understand the context in which diamond mining happens in Sierra Leone. We will, thus, start with a sketch of the country's history. We will pay special attention to the way diamonds have shaped the fate of the country, and the way that the civil war at the turn of the millennium changed the global approach to governance of the diamond sector.

A brief history of Sierra Leone

Sierra Leone became an independent country on April the 27th of 1961. Before that day, the country was a British Crown Colony whose origins were connected to a philanthropic project for resettling liberated African slaves on African soil (Alie, 2016; Fanthorpe and Gabelle, 2013). During the colonial age, Freetown, the country's capital city, was a thriving port city with 30.000 inhabitants and a strategic location for the trans-Atlantic trade (ibid.). But the history of the country radically changed when the prospectors of the Sierra Leone Geological Service discovered extensive

alluvial diamond deposits in the early 1930s. The British colonial authorities granted exclusive mining rights to the Sierra Leone Selection Trust Limited but they underestimated the expectations that this finding could generate within the population (Alie, 2016, p. 137).

Typically, in mining a distinction can be made between artisanal and industrial mining, depending on what type of deposit is being mined (D'Angelo, 2014). In the case of diamonds, one typically distinguishes between kimberlite mines and alluvial mines. According to the World Diamond Council, a conglomerate of different actors in the global diamond value chain: "[a]lluvial diamonds is the term used to describe diamonds that have been removed from the primary source (Kimberlite) by natural erosive action over millions of years, and eventually deposited in a new environment such as a river bed, an ocean floor or a shoreline." (World Diamond Council, n.d.). Kimberlite mines require industrial-scale exploitation and are concentrated in a few square kilometres; alluvial mines, on the other hand, are spread over vast areas and not deep under the surface. The latter can, therefore, be mined manually with only basic tools. Therefore, alluvial deposits are accessible to artisanal miners with shovels, sieves and buckets (Le Billon, 2014). The diamond deposits in Sierra Leone were dispersed over an area of more than 20,000 km² and, therefore, neither guarded nor fenced. Consequently, they soon attracted unauthorized peasants from all around West Africa. This first illicit 'diamond rush' marked the beginning of artisanal mining in the country (Fanthorpe and Gabelle, 2013).

The Sierra Leone Selection Trust used its own paramilitary forces to repress illegal mining when the miners protested, demanding a radical shift in the way the diamond wealth was controlled (Fanthorpe and Maconachie, 2010). The legalization of artisanal mining in 1956 did not put an end to the violent conflicts in the countryside, which created the conditions for the rise of the *All People Congress* (APC) party, led by Siaka Stevens in 1967 (Le Billon, 2014). The response of the new government was the declaration of the state of emergency – the first step in a process of centralization and debureaucratization that weakened the state's institutions (Fanthorpe and Gabelle, 2013). Siaka Stevens gave himself the role of Executive President and completed the project for an autocratic state with the adoption of a one-party constitution in 1978 (ibid.). The civil uprising that followed was violently suppressed and the election of local governments indefinitely suspended (Alie, 2016). Exploiting their new positions of power, the members of Stevens' party secured their dominance over the mining sector and converted the diamond resources into private wealth by politically managing the distribution of mining licences (Le Billon, 2014). This created

the conditions for the marginalization of the formal government institutions and the establishment of what some observers defined as a 'shadow state' (Fanthorpe and Gabelle, 2013; Le Billon, 2014): "a state only in name whose facade serves a criminal elite to plunder the nation's resources for private and political advancement" (Engwicht, 2018a, p. 262).

The negative effects of this kind of mismanagement were not long in coming. In the 1980s, Sierra Leone reached a point at which the economic breakdown was inescapable: hyperinflation, mass unemployment, and shortages of basic commodities were only the most tangible symptoms of a compromised political system (Engwicht, 2018a). When the crisis emerged in all its rich complexity and Stevens left power, the diamond sector was already almost completely informalized, operating outside the law of the state – a situation which benefited the regime supporters (Fanthorpe and Gabelle, 2013). To make things worse, while the artisanal mining sector was suffering from declining deposits, an increasing part of the population migrated to the mining regions in the hope of finding means of livelihood in the midst of an economic crisis, which affected the other productive sectors (Le Billon, 2014). For its part, the state ran out of resources and was unable to pay the salaries of both civil servants and the military (Fanthorpe and Gabelle, 2013).

In this context, characterized by a complete lack of formal order, the Revolutionary United Front (RUF) found a breeding ground for an insurgency (ibid.). They seized this opportunity by occupying the eastern part of the country, where most of the diamond fields are located. On March the 23rd of 1991, they attacked a border town in the Kailahun district and within a month had occupied the entire district (Alie, 2016, p. 202). It was the beginning of a decade-long Civil War.

The Civil War

The years following the end of the Cold War became synonymous with peace and stability in the Western world. In Sierra Leone, on the contrary, they represent the beginning of a decade-long, bloody conflict (1991-2002) between the government and the Revolutionary United Front (RUF) rebel army. The civil war left at least 75,000 victims amongst which thousands of women, men and children permanently disfigured without hands or feet. Many children were forced to become soldiers or sex slaves and hundreds of thousands of Sierra Leoneans were displaced (Smillie, 2010). The respective responsibilities of the two parties are still discussed but one thing on which the analysts and media outlets seem to agree is that diamonds played a central role in the conflict. The story of the so-called 'blood diamonds', and the abuses of human rights that were taking place

in the mining areas of Sierra Leone, received massive media coverage. They inspired popular culture in the form of books, documentaries and movies - among which the most famous is probably the movie *Blood Diamond,* directed by Edward Zwick and starring Leonardo DiCaprio (D'Angelo, 2013).

On the other hand, it attracted the attention of the UN Security Council which heavily sanctioned the trade of illegal diamonds (Le Billon and Levin, 2009). Misquoting Marilyn Monroe, one could argue that, at the time, the precious gem was the "rebel's best friend" (Le Billon, 2014, p. 86), being highly valuable, small, low-weight, easily concealable, anonymous, and internationally tradable (loc.cit., p. 109). Even Al Qaeda's terrorist cells chose to launder money coming from illicit activities through the diamonds mined under rebel control in Sierra Leone (D'Angelo, 2015a; Farah, 2001; Le Billon, 2014). However, while the attention of the international community was mainly focused on the diamonds as sources of funding for the RUF, it should be noted that the gem played an important role on both sides of the conflict. The Sierra Leonean government itself contracted a South African-based mercenary group for conducting offensive operations against the RUF by promising large mining concessions in the diamond fields (Francis, 1999).

As such, even if the civil war was not started only for the diamonds, they helped to significantly prolong the conflict (Le Billon, 2014). Many advocacy groups, like Global Witness and Partnership Africa-Canada, launched public campaigns in order to create awareness around the 'blood diamonds'. They were successful not only in showing the complicity of the international diamond industry but also in creating a connection between the conflicts in Sierra Leone and the diamonds sold to consumers in wealthy countries (Haufler, 2009; Le Billon, 2014). However, this strategy didn't last long. The advocacy groups soon realized that they had to stop calling for a complete diamond boycott because this would have affected hundreds of thousands of jobs around the world, not only in the countries where the diamonds were mined but also where the diamond cutters were based, like India (Le Billon, 2014).

When the civil war ended in 2002, the post-conflict transition was unsurprisingly marked by security concerns. Development analysts recognized that, before implementing reforms in the country, it was first necessary to understand the causes that led to war in the first place (D'Angelo, 2013). Many conflict analysts underline that ethnicity and religion were not significant factors leading to the civil war. Instead, what emerged from the research conducted by the Sierra Leone Truth and Reconciliation Commission (SLTRC) was the picture of a country that had been marked

by widespread corruption and nepotism of political elites, responsible for plundering the nation's mineral wealth (Fanthorpe and Gabelle, 2013). An analysis that is shared by most conflict analysts (Alie, 2016; Le Billon, 2014). Political clientelism, mismanagement of resources, and massive inequality exacerbated the discontent and frustration of the population, in particular of the youth (Fanthorpe and Gabelle, 2013; Le Billon and Levin, 2009). Since Sierra Leone is a country with a low average age, the aforementioned young generation played a crucial role in the civil war. This generation was left unable to earn their livelihood because of a system that exclusively benefited the political elite (Fanthorpe and Gabelle, 2013; Fanthorpe and Maconachie, 2010). They, therefore, became the main recruitment base for the Revolutionary United Front (RUF) which promised to overthrow the old structure of power and make them rich (Engwicht, 2018a).

When hostilities officially ended in 2002, it was clear that these promises had not been fulfilled. The artisanal diamond sector still employed an estimated 200,000 artisanal miners and the majority of them were, allegedly, former combatants, struggling for survival and subject to the same old forms of domination in the mining fields (Fanthorpe and Maconachie, 2010; Le Billon and Levin, 2009).

Sierra Leone - a country's profile

Clear evidence that diamond wealth can turn into a curse is the Kono District, located in the North-Eastern part of Sierra Leone and comprising the largest diamondiferous area in the country. Most of its chiefdoms have rich deposits of diamonds and other minerals, but the region is one of the poorest in the country - the poverty rate in the region was 61.3% in 2013, compared to a national rate of 52.9% (Himmelein, 2015). On top of this, the District has poor health facilities, limited educational opportunities, and there are many reported cases of human rights abuses (Oxfam, 2014).

However, the picture is not much different if the analysis is extended to Sierra Leone as a whole. More than 50 percent of its more than seven million inhabitants live below the income poverty line as defined by the UNDP ($1.90 a day) and do not have the resources to buy basic necessities like food and safe drinking water on a regular basis (The World Bank, 2018; UNDP, 2019). The educational and health systems have serious shortcomings, as proven by a literacy rate of only 32.4% and a mortality rate at birth as high as 8.3% (UNDP, 2019). These figures are amongst the worst in the world but there has been a slight improvement in the last few years. Since

1990, the life expectancy at birth in the country increased by 14.9 years while the expected years of schooling increased by 4.9 years (UNDP, 2018). Today, Sierra Leone is ranked 184th out of 189 countries in the UNDP Human Development Index (UNDP, 2019).

The national budget is still highly dependent on donors with 22% of it funded by grants (Government of Sierra Leone, 2016). Additionally, two-thirds of the population relies on subsistence farming (Oxfam, 2014). However, the unexploited resources of iron, diamonds, and gold have the potential to boost the economy. Before the arrival of the Ebola epidemics, Sierra Leone had indeed the fastest pace of economic growth on the African continent, thanks to the export of these natural resources (Gonzalez and Gutierrez, 2017; Oxfam, 2014). As a matter of fact, the diamond sector itself generated $122,316,627.92 in 2017 alone (Kimberley Process, 2019a).

Today, small-scale mining still represents about 50 percent of the diamond production in the country but the balance is shifting in favour of the industrial mining companies (Engwicht, 2017; USAID, 2010). Alluvial diamond mining is showing signs of diminishing returns and already-mined areas are "reworked" (Pijpers, 2011) - it could even cease to be a viable economic activity in the near future (Fanthorpe and Gabelle, 2013). On top of this, the artisanal mining sector also has to cope with the smuggling of diamonds to neighbouring countries. The scope of illicit trading is, by its very nature, impossible to measure and the loss of revenue for the local government is, therefore, unknown. However, the significant increase in diamond exports in the post-war period - from $26 million in 2001 to $163 million in 2012 - points to an overall decrease in diamond smuggling (Engwicht, 2017; USAID, 2010).

The Kimberley Process and reforms

The decrease in diamond smuggling is in turn often associated with the implementation of new regulatory schemes, the most successful and prominent of which is the Kimberley Process Certification Scheme (KPCS) (Engwicht, 2018b; Haufler, 2009). This transnational regulatory scheme was developed in reaction to the civil wars in Angola and Sierra Leone since in both cases the mining and trading of diamonds were fuelling the escalation of the conflicts. It aims at overseeing the global market of the valuable mineral (Engwicht, 2018b; Kimberley Process Pannel, 2013). More specifically, the KPCS is designed as a framework to encourage and incentivize corporate responsibility and ethical behaviour of multinational companies in conflict areas (Haufler, 2009; Kimberley Process Pannel, 2013). The ambitious goal is to harness the power of the private sector

and turn it into a force for peace through a multi-stakeholder engagement. Indeed, the potential of this certification scheme lies in the participation of not only actors from the diamond industry, but also governments of importing and exporting states, and civil society organizations (ibid.).

The impact of the KPCS is tangible not only in Sierra Leone, one of its first members, but in the international diamond market as a whole. Though it is difficult to estimate the global volume of illegal diamond trading prior to the implementation of the certification scheme (unofficial estimates range between 15% and 4%), the KPCS website reports that "over 99% of the diamonds traded today are conflict-free" (Haufler, 2009, p. 411; Kimberley Process, 2019b). Today, the KPCS comprises 81 countries, accounting for 99.8 of the global production of rough diamonds (Kimberley Process, 2019b).

One important factor which facilitated the negotiations among the KPCS's founding parties was the oligopolistic structure of the diamond market. As a matter of fact, the industry provides one of the most successful and long-lived examples of a cartel in history. Created by De Beers over a century ago, the cartel provided extensive powers to a handful of players in the diamond market. De Beers was able to control most of the supply and distribution of diamonds worldwide "by manipulating production at its own mines, buying up other companies and mines, negotiating long-term supply contracts with other producers, and maintaining a stockpile of rough diamonds that it could release on the market to stabilize supply" (Haufler, 2009, p. 405). In other words, De Beers had the resources to support the cartel. In the event that one of the smaller industry participants was not following the rules dictated by the cartel's members, De Beers had the capacity to discipline these turbulent actors by selling the rough diamonds from its stockpile and consequently drive prices down (ibid.).

However, the longevity of this cartel was put at risk in the 1990s by the spreading of conflicts in many African diamond-producing states. Both rebels and government were seeking funding through the sale of rough diamonds in the international market and De Beers gradually lost the capacity to control prices, since they were not able to buy up the excessive supply from these countries anymore (ibid.). Simultaneously, new significant deposits were found outside of Africa, and the collapse of the Soviet Union made Russian diamonds accessible to consumers in the West. The company consequently lost a big portion of its market share (dropping from 85 to 65%) and new, smaller players were ready to enter (ibid.).

Coincidence or not, the first negotiations for the implementation of the KPCS started in the same period in which the cartel began to weaken. Antwerp's import statistics clearly showed that the industry was complacent with diamond trafficking (Le Billon, 2014) and activist campaigns were raising global awareness about the role played by diamonds in the civil wars. The risk of consumer boycott was becoming concrete (Engwicht, 2018b; Le Billon, 2014).

The major industry actors first carefully discarded any connection with the "conflict diamonds" and resisted the insistent request of the campaigners to end the trade with the countries at war (Le Billon and Levin, 2009). Some industry participants argued that it was impossible to distinguish ethical diamonds from the ones connected to violence and exploitation (Haufler, 2009). However, they soon realized that these campaigns represented an existential threat for the whole diamond market.

The threat was all the more real because De Beers had built its empire by pursuing a marketing strategy that turned the diamonds from commodities into luxury goods and created the illusion of scarcity to justify the high prices of the gems (loc.cit., p. 406). A clear example of how the diamond industry influenced consumers' perception is the now common idea that an engagement ring must contain a diamond - a tradition which, contrary to what one might believe, has a quite recent origin (Haufler, 2009). It was only in 1947 that De Beers launched its slogan "A Diamond is Forever", which started the association between diamonds and engagement rings (Sullivan, 2019).

Usually seen as symbols of love and commitment, the diamonds were being re-branded by the activist campaigns as 'blood diamonds' through the vivid accounts of how the rebels exchanging diamonds in Sierra Leone were the same who cut off the limbs of innocent people (Pijpers, 2017). The diamond industry had to act if they wanted to re-establish the good reputation of diamonds and protect their image as luxury products (Le Billon and Levin, 2009). In this perspective, the KPCS was an opportunity for a discursive repositioning, based on the icon of the 'ethical', 'conflict free' diamond (Le Billon, 2014).

The interests of public and private sector, activists and companies, were, therefore, accidentally aligned. Though for different reasons, the activists as much as the companies had an interest in keeping the price of diamonds high, and in stopping the conflicts in the diamond-producing countries (Haufler, 2009). These circumstances made the market ripe for regulation.

The first negotiations were held in May of 2000 in Kimberley, South Africa, the site of one of the most famous diamond mines in the world. It was the constitutive meeting of the Kimberley Process and included industry representatives, delegates from major consuming and producing states, and the activists of the civil society organizations who had started the 'blood diamond' campaign (loc.cit., p. 409). This consortium developed the structure and the rules of the scheme in about two years and the KPCS went into effect in January of 2003 (Engwicht, 2018b).

The KPCS provides that "rough diamonds (diamonds that are uncut or minimally cut and unpolished) would be packaged together in a parcel with a forgery-resistant certificate that documents the origin of the stones" (Haufler, 2009, p. 409). This means that it becomes possible to track the movements of the diamonds and document who handled them through a system of warranties verified by independent auditors. As a necessary condition to achieve full traceability and transparency, the participants of the certification scheme are supposed to ensure that the diamonds are properly certified every time they exchange them, and they must regularly update the statistics on diamond production levels and volume of export. The member states are required, for their part, to implement laws which criminalize the trade of diamonds with countries that are not members of the KPCS (Haufler, 2009). Through a combination of national legislation, *ad hoc* institutions, and import/export controls, the member states guarantee that the diamonds shipped abroad are 'conflict free'. In the event that the high level of corruption in a country makes it impossible to implement the rules effectively, the state is violating the terms of the KPCS and, therefore, its membership is revoked (ibid.).

When Sierra Leone became a member of the Kimberley Process, the first step in the implementation process was an overall reform of the institutions governing the country's mineral sector (Engwicht, 2018b). In order to reduce the risk of corruption, the Ministry of Mines and Mineral Resources was complemented by the National Minerals Agency (NMA), whose role is to monitor the compliance to the regulations in the diamond fields (*The National Minerals Agency Act*, 2012). At the same time, Sierra Leone implemented reforms in mining laws and policy with the Mines and Minerals Act in 2009, which addressed unregulated areas like artisanal miners' safety during work and the contribution of foreign companies to the development of local communities (*The Mines and Minerals Act*, 2009). Furthermore, in order to curb the evasion of payments and the widespread corruption in the mining sector, the NMA launched a Mining Cadastre Admin-

istration System (MCAS), a publicly accessible system for logging all the mineral extraction licences in Sierra Leone (Mustapha and Van der Linde, 2012; National Mineral Agency, 2019). Ensuring the full transparency through technology and paper trails was, therefore, regarded as the key solution for tackling the smuggling of diamonds.

The reduction in the export rate of 'conflict diamonds' was not, however, the only consequence of the implementation of the KPCS. One relevant side effect was the preservation of the diamond market itself (Haufler, 2009; The Economist, 2007). As a matter of fact, the controls provided by KPCS assure that "Kimberley members only trade with other Kimberley members, raising the cost for those outside the 'club'" (Haufler, 2009). Studies measuring the success of this initiative by solely looking at the reduction of the international trade of 'conflict diamonds' should, therefore, not overlook the fact that it also created high barriers of entry for smaller market actors.

However, the seizure of power of a few multinationals over the diamond market is not the only aspect of the initiative that attracts criticism. Many observers noticed that there are many loopholes in the structure of the KPCS. The diamond-producing African countries often register high levels of corruption. This makes the internal controls, necessary for ensuring the traceability of the diamonds, unreliable (Engwicht, 2018b). The certification document, proving the origin of a diamond, can be falsified by malevolent government officials and, in that case, gems coming from suspicious sources would be channelled into the legal market. Furthermore, the absence of proper state enforcement of the KPCS regulations allows the internal exchange of rough diamonds among illicit middlemen and the export of uncertified diamonds (loc.cit., p. 472).

Despite the criticism for its internal problems, the KPCS is a strong institution and one of the most successful global governance initiatives for mineral resources (Engwicht, 2018b; Haufler, 2009). Similar schemes, like the Extractive Industries Transparency Initiative (EITI), had an effect in reducing rebel founding but they are weaker than the KPCS because they cannot count on a broad coalition of government, industry and civil society actors (Haufler, 2009; Van Alstine and Smith, 2018).

Chapter 1 - Artisanal Diamond Mining in Sierra Leone

In this chapter, we will present the value chain of artisanal diamond mining in Sierra Leone, in its current state. We will analyse the relevant legal framework, the actors along the chain, and the way that these actors actually practice diamond trading. It is, consequently, the chapter where we

will present most of our empirical work. As we outlined in the introduction, our research methodology was aiming at uncovering paradoxes and puzzlements that we encountered in the field. We were, therefore, primarily interested in the different actors' own perspective on the diamond trade and their role in it. As explained before, since our paradigm was guided by philosophical considerations, it was important for us to get an exemplary perspective of as many actors along the chain as possible, while it was less important to achieve 'validity' in a social scientific sense.

We began by reconstructing the diamond value chain through observational data and several formal interviews conducted during a one-week field research in late March of 2019. The focus areas of the field research were in Freetown, the country's capital, and in the Kono district, which is the most diamond-rich district in Sierra Leone. In total, 12 interviews concerning the diamond value chain were conducted with artisanal miners, NGOs, and government agencies, all of them in an open-ended, semi-structured fashion[2]. We chose to conduct semi-structured interviews with a set of predefined questions but giving interviewees the possibility to deviate from these questions if they chose to do so. This format, in our opinion, presented the best way to keep a basic structure while still leaving participants the freedom to focus on those topics that they found relevant. Our interview partners were chosen in such a way that we could get the perspective of as many different actors as possible. We were interested both in actors that were directly active in the diamond trade and in those that were located in the periphery of the field, such as regulatory agencies and NGOs. The questions were structured in such a way that the interviewees could present their own view on their specific function within the chain, their relation to other actors in the chain, and their perspective on the artisanal diamond sector as a whole. Questions that made presuppositions were, thus, avoided. The questionnaires evolved dynamically in the field and were adjusted whenever we received new information. For instance, in case one interview partner made a statement about a future interview partner, we confronted the latter with it, whenever possible. While Sierra Leone uses English as an official language, regional dialects are common. Consequently, some of our interviews were conducted with the help of a local guide. To ensure the free participation of our interview partners, in a sector that is riddled with distrust (see below), we anonymised our interview partners and will, consequently, address them with their respective function in the chain, or the organization they belong to, instead of their names. Finally, we used the relevant

[2] All interview transcriptions are available on request.

legislative texts, as well as academic research and NGO reports to triangulate what our field studies showed.

In this chapter, we will proceed with an outline of the structure of the value chain as it is today. We will pay special attention to the social dynamics that currently govern the chain and contrast it with the legal rules. After this, following our research methodology, we will begin to discuss the most striking paradoxes we found in this sector. Firstly, this will be the famous diamond-paradox, concerning the value of diamonds. Secondly, we will have a closer look on why certain actors remain active in the chain even though this behaviour can be described as economically irrational. We will argue that both of these phenomena are consequences of the very constitution of diamonds and utilize this as a steppingstone for our considerations on transparency and technology in the following chapter.

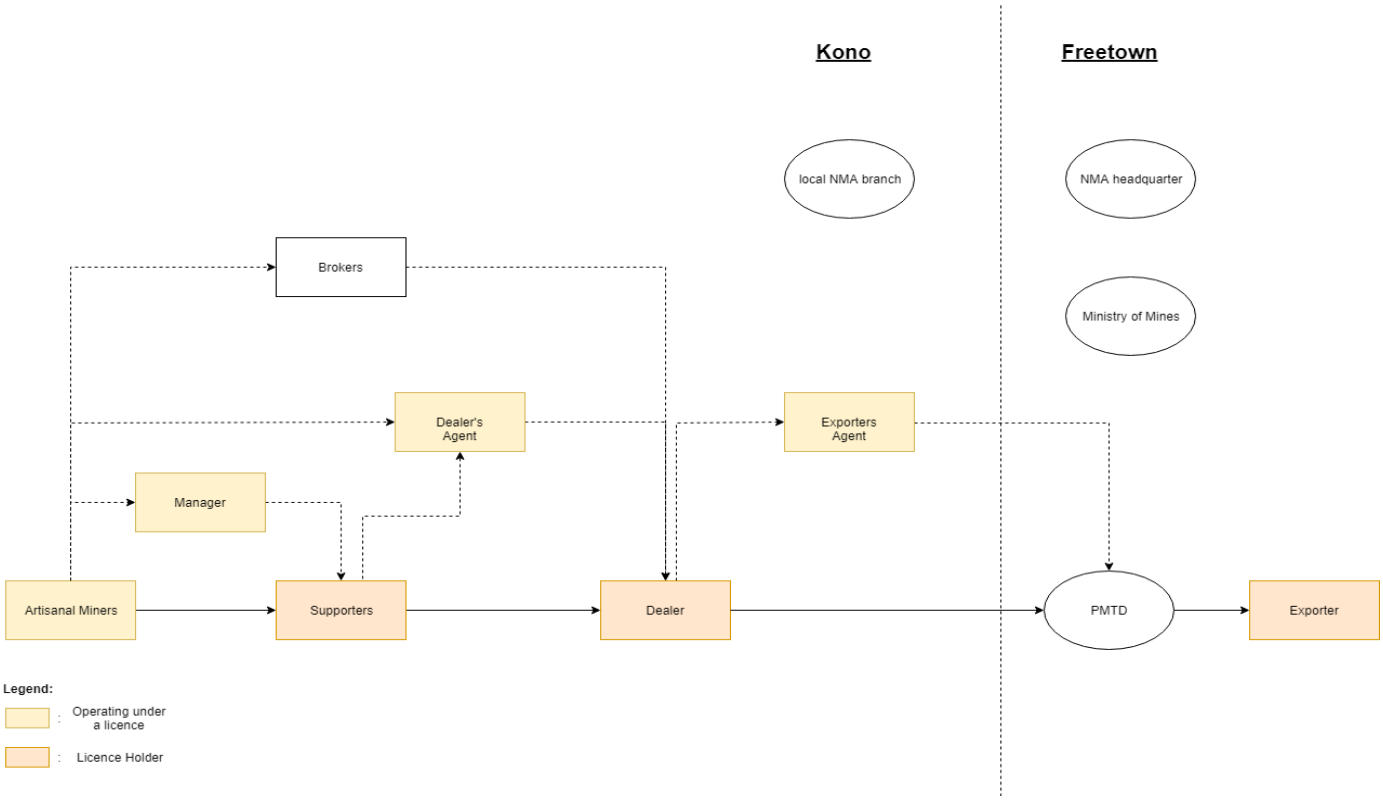

Figure 1 - Overview about the stakeholders involved in the artisanal diamond mining chain (own picture).

As outlined before, we will focus our attention in this chapter on the value chain of artisanal mining and leave industrial mining largely out of the picture. To recapitulate, the majority of diamonds in Sierra Leone were historically located in alluvial deposits, stretched over vast areas of land, in a relatively random fashion, and often closely underneath the surface. This has made the alluvial diamond sector difficult to regulate or govern effectively. However, as the Kimberley Process prohibits members to trade with non-members, the government of Sierra Leone had to translate the required norms into the local reality, if they wanted to save their international diamond trade.

Thus, in an attempt to comply with the Kimberley Process' requirements, the government of Sierra Leone created a licence system as a provision in the Mines and Minerals Act of 2009 (*The Mines and Minerals Act*, 2009). According to this Act, whenever a diamond is sold to a dealer, the latter has an obligation to issue a receipt of the payment and record the cost of this transaction on his licence. The licence-holder for the mining pit (most often a 'supporter'), in turn, records the same transaction on his own licence. In addition, a scorecard is attached to the mining licence for the supporter, since the latter has to record the winning right at the site where the diamond is found

and then submit it to the regional mining directorate. Whenever the miners or the supporters sell a diamond, they need to demand a receipt of sale issued by the dealer in order to record the necessary information on their own licence. This trail of recording spans all actors, from the mining pit to the point of export.

The idea behind this system is to create a comprehensive tracing mechanism. Anybody, who wants to legally trade diamonds, needs a licence, from the miner to the exporter and everybody in between (*The Mines and Minerals Act*, 2009, p. 127f.). In the ideal case, if all the actors fill in the information correctly, the diamond cannot get out of the legitimate chain. These receipts show the movement of the diamond along the chain, and the government can easily recognize the path of the diamond and its specific origin by cross-checking the information contained in the dealer's recording book with the recording on the licences coming from the mining field.

The licence is given out by the local branch of the National Minerals Agency (NMA) and must be signed by the "relevant chiefdom authority" as well as "the Chiefdom Mining Allocation Committee or rightful occupiers or owners of the land for mining purposes" of the area where the mining is supposed to take place (Ministry of Mines and Ressources, 2009, p. 33; *The Mines and Minerals Act*, 2009, p. 64; *The National Minerals Agency Act*, 2012, p. 8). This means that in the majority of cases an applicant needs the consent of the NMA, the relevant district chief (paramount chief), and the local village chief. To even be eligible for a licence, the applicant must pay a surface-rent to the owner of the land, mostly the chief. Only then can he proceed to apply for the actual licence, which requires an additional fee to the NMA. The licence is then tied to a specific patch of land where the holder of the licence is granted exclusive right to undertake mining operations with a limited number of workers and with strict limitations. Amongst other things, the artisanal mining licence prohibits the usage of child workers, limits the digging to a depth of 10 meters, and imposes some environmental regulations on the operation, such as an obligation to restore the land after the operation is finished. After one year of operation, the licence must be renewed (*The Mines and Minerals Act*, 2009, pp. 64–68).

Unsurprisingly, the licence system comes with a set of problems. We will elaborate on some of them when we describe the different actors of the chain. As figure 1 demonstrates, the diamond value chain in Sierra Leone spans from the mining fields of Kono to the exporters in Freetown. We will now elaborate on the role of the different actors, beginning with the miners and supporters.

Miners and Supporters

Artisanal mining is a labour-intensive business. As mentioned above, diamonds are largely found in alluvial deposits and artisanal mining is thus conducted with simple tools, primarily shovels, shakers, and sieves. The process of how the miners get the diamonds can be divided into several phases.

In a first step the miners, typically 4 to 10 people in a single mining pit, dig in the ground until they reach an underlying layer of gravel. This gravel will be moved with a shifter and piled into a heap (Artisanal Miners, personal interview, March 22, 2019)

Figure 2 - A heap of gravel in a digging field (own picture).

When enough gravel is accumulated, the process continues by washing the gravel in water that is always nearby in any artisanal diamond mine (ibid.).

Figure 3 - A mining pit including a water source for washing the gravel (own picture).

The miners we interviewed moved the gravel with a shifter and then proceed with a shaker in order to wash out the gravel. When they wash the gravel with the sieve, if they do it correctly, the diamond will shoot up amongst the sand through the creation of a centrifugal force (D'Angelo, 2013).

"It involves certain skills", as a group of miners that we interviewed told us (Artisanal miners, personal interview, March 22, 2019).

It also involves high financial risk, since alluvial reserves are scattered across the land and artisanal miners essentially have to search for them randomly. Since artisanal miners are often poor and cannot sustain themselves for the time it would take them to find a diamond, a variety of interconnected roles and dependencies have emerged (Pijpers, 2017). Once the diamond is dug out with the aforementioned method, it follows a complex path involving many intermediaries along the value chain before ending up in the hands of the exporter (Partnership Africa Canada and Global Witness, 2004).

The prevailing structure in the artisanal sector in Sierra Leone is the *gang*, a group comprising a variable number of miners, which are dependent on a supporter (in the local language, *sopota*) (D'Angelo, 2013). The supporter provides the miners with the tools they need for digging, sustains them with food (mostly a specified amount of rice) and often gives the miners a small amount of money per diem, as well as irregular gifts (Engwicht, 2018b; Partnership Africa Canada and Global Witness, 2004). He is also supposed to buy a mining licence for legalizing the extraction of diamonds in the specific plot of land where the miners are working and pay the lease for the land.

With larger amounts of miners involved, a division of tasks can emerge. Whilst the miners we saw and interviewed were engaged in all parts of the extraction process, D'Angelo reports gangs with a high degree of division of labour (D'Angelo, 2013). The 'diggers' (*diga*) can be distinguished from others specialized in washing and sieving the gravel, the 'washers'. In larger mining fields there can also be roles outside the mine, like the watchmen (*wachman*), whose task it is to keep away unwanted visitors and stay awake during the night to prevent the theft of equipment or unprocessed gravel (ibid.). The structure of this organization is, generally, fluid, since it can happen that the same person plays different roles along the extractive process or even during the same day.

While the role of child workers in diamond mining has decreased significantly in the past years, partially due to the role of NGO intervention, it is still present (Bøås and Hatløy, 2006; Oxfam, 2014). As mining requires heavy physical work, children are mostly not involved in mining itself but take on supportive roles outside the mines such as bringing water (*wataboy*) or cooking for the miners (D'Angelo, 2013).

There are also miners with precise roles and responsibilities, as in the case of the *gang lida*, the manager of the *gang*. He does not only coordinate the work of the miners but also plays a crucial role as intermediary between them and the supporter. In the event that the supporter wants to communicate with the gang, this happens through the *gang lida;* at the same time, if there are problems that the *gang* wants to discuss with the supporter, the *gang lida* creates a line of communication with him (D'Angelo, 2014). This is necessary, because the supporter is often not located in the mining area itself. Rarely a full-time miner himself, the supporter may be a dealer, exporter, businessman, or politician willing to pre-finance a mining operation (Pijpers, 2017). This is why they often rely on trusted persons, like a family member, to keep an eye on the day to day operation. In case they are not themselves active in the pit, the law even mandates the supporters to choose such a person (*The Mines and Minerals Act*, 2009, p. 67).

The task of taking care of the fragile relationship between the workers and the supporter is not an easy one. Large portions of rice, cigarettes, and medicines are offered by the *gang lida* for motivating the miners and dissuade them from stealing the diamonds (D'Angelo, 2014). The same *gang lida* usually takes part in the work of the mine, in particular in the most delicate stages of the process, namely the washing stage when the diamond shows itself. He brings the diamonds to the supporter as soon as they are found by the miners in the field (ibid.).

When the supporter receives the diamond, the workforce receives a percentage of its value that was previously agreed upon (D'Angelo, 2014, 2013). The supporters usually demand a lion's share, on average two-thirds of the revenues from the sale of the diamond to the dealer, according to our interview partners at the Development Diamond Initiative (DDI), an international NGO promoting ethically sourced diamonds (DDI, personal interview, March 22, 2019). The supporter can alternatively propose the so-called Kosovo deal to the miners, a solution in which day workers are hired and paid in advance like normal employees (Partnership Africa Canada and Global Witness, 2004). In exchange for better conditions, the supporter claims the full ownership of any diamond that is found. However, this solution is not common since it implies a higher risk for the supporter: he could find himself in the position of paying the workers for years without any significant findings.

Whatever the formula proposed by the supporter, the diggers are the ones reaping the smallest share of profit and they are, therefore, the least likely to improve their standard of living among

the different actors involved in the diamond value chain (Le Billon, 2014). The diggers are - somewhat paradoxically - particularly disadvantaged in *legal* diamond mining. In the absence of a licence-holder or formal supporter, the operations are usually organized in a more egalitarian way, since the diggers have direct control over the fruits of their labour and they share the winnings equally among them (Engwicht, 2018a). With the licence system in place, on the other hand, they are completely reliant on the supporter if they want to sell the diamond through a legal channel, which gives the supporters a huge bargaining power. Not having a licence themselves, the miners cannot legally trade with a dealer who owns a licence, as the latter would have to record the licence of the mine, in which the diamond was found, and this licence can potentially be cross-checked by the NMA. The only alternative to this dependency is to smuggle the diamond out of the mine, with the help of a broker, which we will discuss in the next section.

The relationship between miners and supporters can ultimately be described as complex. Experts have contrasting views of the system, with many of them arguing that, on the one hand, the supporter-miner relationship probably plays an important role for ensuring the social and economic protection of the miners and their families in a context of uncertainty (Le Billon and Levin, 2009). On the other hand, it can easily take the form of exploitation (D'Angelo, 2014) or debt bondage (Engwicht, 2018a). As one expert put it in an informal meeting with us: "Yes, the miners are dependent on the supporters and they take a big part of the winning, but on the other hand if the miner's wife is sick he will go to the supporter and he will take care of it. Without the supporter the miner would have no chance to get any health-support, certainly not from the state".

Brokers

The diamond can leave the mining field in two ways: Either the supporter sells it to a (licensed) dealer, or the miner smuggles it out and sells it himself. In the latter case, when the miner finds a diamond without the *gang lida* noticing it, he may decide to sell it himself in Koidu, the capital of Kono District, to get a larger share (Pijpers, 2017). As he does not possess a licence himself and smuggling a diamond out of the country may not be worth the effort (most findings that can be smuggled are rather small), they need a way to channel the stone back into the legal market. Gathered in certain spots in the city, the so-called *banabana* or brokers are specialized in the exchange of diamonds brought by unlicensed miners (Pijpers, 2017). Other times, the *banabana* meet the

miners in the mines to buy the small and less valuable gems, saving in this way the miners a trip to the city to sell their findings.

The *banabana* are most of the times supporters themselves - nine out of ten according to a regional Oxfam manager (Oxfam, personal interview, March 22, 2019). These intermediaries enjoy higher trust from the miners since they are predominantly of West African descent and often have a background as workers in the mines, neither of which applies to the majority of dealers (Engwicht, 2018a). The dealers, in turn, value the *banabana*'s connection to the miners, as they do not have the means to employ legal agents that channel the diamonds into their hands. If they can find a way to convince a *banabana* to sell to them exclusively, they essentially gain 'freelance' employees that guarantee their supply. The *banabana* are, therefore, deeply ingrained in the diamond value chain and the social organization surrounding it despite the fact that they operate outside the formal market (Engwicht, 2017; Pijpers, 2017). A licence for this kind of brokerage does not exist and this means that they operate mostly 'in the shadows' and the diamonds they trade are untraceable, regardless of the legality or illegality of their extraction (Engwicht, 2017).

The *banabana* can buy the diamonds themselves, mostly to resell them to licensed diamond dealers in Koidu (ibid.). Alternatively, when they do not have sufficient resources, the *banabana* play the role of brokers between sellers and buyers for a commission instead of buying and selling the diamonds themselves. The latter case is more prominent since the *banabana*, especially those living in the provinces, are often impoverished; only few of these brokers acquire wealth by trading goods of high value and if they do, they prefer to take on a dealer's licence themselves (ibid.). This was corroborated by our own interviews with brokers in Koidu. As one broker explained during a group interview: "We here as brokers need a licence as dealers. This would help us to make more profit, we would like to shift from being broker to being a dealer but we need capital to apply for a dealer's licence." (Brokers, personal interview, March 21, 2019).

The NGOs we interviewed often point to the connection between miners and brokers as the most vulnerable link of the diamond value chain. In their perspective, the brokers and dealers make profits taking advantage of the miners. They, thereby, push for the enactment of strong laws in order to prevent any form of exploitation, legitimizing only the actors with valid licences and cutting the illicit intermediaries from the value chain accordingly. As one manager of the DDI told us during an interview: "the brokers promote smuggling, they promote poverty" (DDI, personal interview, March 22, 2019).

However, in contrast to the assumption that illegal trading is the steppingstone to diamond smuggling, some academics point to the fact that the *banabana* overwhelmingly sell their goods to licensed dealers in Sierra Leone (Engwicht, 2018a). Many market actors (and government officials) consider them indispensable despite the fact that their unlicensed activity is formally illegal (Engwicht, 2018b). Indeed, since they buy illegally mined diamonds and sell them to licensed dealers, the middlemen successfully channel the diamonds back into the formal market when they would otherwise be smuggled out of the country, usually to neighbouring Liberia or Guinea (ibid.).

As one broker argued during our group interview, their role is important because when a big diamond is dug out, they usually inform the government before it is smuggled out of the country (Brokers, personal interview, March 21, 2019). Other researchers found similar justifications amongst the *banabana* (Engwicht, 2017). Generally, the brokers we met strongly asserted that it was the dealers who smuggle diamonds out of the country primarily (Brokers, personal interview, March 21, 2019). The reason for this was a supposed lack of resources on the broker's part, specifically a lack of money to cross the border. However, this assertion was called into question by other interviewees at the DDI (DDI, personal interview, March 22, 2019). At any rate, it seems clear that legal market actors can be as responsible for smuggling the diamonds outside the country as the *banabana* if it promises to be profitable; indeed, there is no direct correlation between "whether a diamond has been illegally mined or traded at some point along the value chain and whether it is exported legally or illegally" (Engwicht, 2018b, p. 475). In other words, illegal trading inside the country does not seem to affect illegal smuggling out of the country.

Notwithstanding the fact that the role of the *banabana* is undoubtedly ambiguous, it is undeniable that the local market actors and state agents consider them as pillars of the artisanal diamond market. This is probably why projects aiming at value chain transparency by 'cutting out the middleman' have "so far proven an unattainable goal for reformers" (loc. cit.: 476.). Consequently, many of the most recent projects seek a collaboration with the brokers in an attempt to formalize the market.

Dealers

The dealer, based in Koidu, is the middleman buying the diamonds from supporters and *banabana*. Since a dealership licence does not allow for exports out of the country, he has to sell his diamonds to the international exporters in Freetown. Dealers need a licence to open an office and, since they

are official agents, they are obliged to keep a record of their sales. According to the brokers we interviewed, the licence is essential for the dealer to gain the trust of the *banabana* and enter the market, since the brokers know that they face prison if they sell diamonds to unlicensed dealers; as one *banabana* clearly set it out to us: "if we don't know who you are, you are not in the game and we will not sell to you" (Brokers, personal interview, March 21, 2019).

According to the Precious Mineral Trading Directorate (PMTD), the government's office responsible for valuing diamonds that are exported, the dealers can also decide to finance a specific mine and make a deal with the artisanal miners so that they always sell the diamond directly to them (PMTD, personal interview, March 25, 2019). Once there is a contract in place, the market is formalized, and the dealer receives a regular supply of diamonds. Sometimes dealers also employ their own agents. Similar to the *banabana* in their functions, the dealer's agent goes to the mining sites in order to buy diamonds directly from the miners. The only substantial difference that distinguishes them from the *banabana* is that these agents are part of the formal market since they operate under a licence issued by the NMA. However, the employment of agents is not common for dealers, as it is cheaper for them to rely on the *banabana,* whom they only have to pay once a diamond is found and not on a regular basis.

Exporters

The whole export market comprises no more than a handful of established actors together with a high number of small companies that cyclically dissolve and get replaced after only a few shipments (Engwicht, 2018a; Partnership Africa Canada and Global Witness, 2004). The exporters are based in Freetown but have strong connections with the actors in the diamondiferous areas; according to the PMTD they usually buy the diamonds from dealers but the declining volume of production of alluvial diamonds is leading exporters to move down the value chain and trade with the miners directly (PMTD, personal interview, March 25, 2019).

In theory dealers decide freely what kind of diamond they want to buy from the licence holders in the communities and then sell them to the exporter who offers the best price. According to our interview partners, however, the reality is that the export houses are most of the times financing and thus controlling the dealers (DDI, personal interview, March 22, 2019). In our interview, the managers of the DDI claimed that exporters often buy the licence on behalf of dealers

and then give it to them; in return for that favour, the dealers oblige themselves to sell their diamonds exclusively to this exporter. Additionally, our interviewees at the PMTD confirmed that even those dealers that buy their own licences can enter formalized contracts to sell to one exporter exclusively (PMTD, personal interview, March 25, 2019). In exchange, they are usually guaranteed a previously agreed upon price per carat, in order to protect the dealers from future price fluctuations - effectively making the contract a derivative, or more specifically, a future contract (Koppenhaver, 2010).

Once arrived at the point of export, the diamond is certified by the government according to the Kimberley Process Certification standards and is evaluated at the Precious Mineral Trading Directorate (PMTD), located in Freetown. At this point, three different valuators check the diamond according to the Rapaport Scheme, an international standard scheme outlining the value of the different typologies of diamonds on a weekly basis (PMTD, personal interview, March 25, 2019). With this scheme the valuators estimate the diamond's price and make sure that it is stated correctly on the licence. The valuators come from three different sources: one of them is employed by the exporter, one by the government, and one is an independent international valuator (ibid.). If there is disagreement amongst the valuators, the highest estimated price is taken to be true and it is this value on which taxes are applied and which is recorded in the export statistics. No diamond can legally leave the country without this step.

After this valuation is done, the diamond leaves Sierra Leone still in rough form. The international buyers then direct them to the cutting and polishing phases, which usually take place in India (Read and Janse, 2009, p. 8). At the end of the process, the diamonds are sorted and manufactured and finally sold to retailers around the world.

Social Dynamics and Dependencies

To understand the artisanal diamond value chain in Sierra Leone properly, one must understand that the entire system is highly dependent on the social relations between the different actors. The diamond diggers are the most vulnerable actors in the supply chain, and, for this reason, they need to build alliances and trust relationships in order to survive (Pijpers, 2017). They have to choose their social network and their future partners carefully. As remarked by Engwicht, if the miner sells the diamond to the right buyer, he can then turn to him whenever he is in times of need

(Engwicht, 2018a); every transaction creates a social obligation that can become useful for the future - a sort of social security system (D'Angelo, 2013; Pijpers, 2017).

The most important criteria for selecting the right social networks is trust (ibid.). The diamond supply chain is characterized by many asymmetries in terms of power and knowledge, especially since most of the miners do not possess the necessary expertise to value the diamonds they find (D'Angelo, 2014; Partnership Africa Canada and Global Witness, 2004). When we asked the miners we interviewed about the way they evaluate the diamonds' worth, the answer was evasive, essentially relying on word of mouth (Artisanal Miners, personal interview, March 21, 2019). Since the miners are dependent on others, the only assurance they have for receiving a fair share from the sale of the diamond is the trustworthiness of the other negotiating party (D'Angelo, 2014; Pijpers, 2017). Not surprisingly, therefore, the miners prefer to build their own networks with family members and friends (Pijpers, 2017).

These networks have a key role for the functioning of the sector since they provide the miners with the means for survival. However, the combination of these networks gives shape to a patronage system which accentuates the already existing asymmetries and, in some cases, is exploitative for the most vulnerable parts of the population (Engwicht, 2018a). Furthermore, one of the main shortcomings of this system is the fragility of the trust relationships. Market actors have many anecdotes describing deception and betrayal in the sector like the following, reported by Pijpers:

> The dealer paid him 30 million Leones for the diamond. Although he did not realize it yet, that amount was far too little. The dealer left the country with the diamond. He was afraid that people wanted to rob and maybe kill him in order to lay their hands on this diamond. This digger was not only cheated by his dealer. As he was illiterate, he went to the dealer with somebody else, a friend, who was literate. However, this friend and the dealer made a deal together and this friend is now in Liberia. The deception is even worse for the digger, because he was given a lower amount than what they have told him. Because he was illiterate though, he could not recount and did not realize he was deceived. (Pijpers, 2017)

The creation of trust relationships that are always open to violation may seem paradoxical (Pijpers, 2017). However, despite these flaws, the patronage system not only benefits from a general social legitimacy but it is also hard to change; projects by NGOs that attempted to weaken it have mostly failed (Levin and Turay, 2008). The best explanation for the reliance of the miners on these fragile networks is their belief that, in a context where the legal system is unreliable, these relations are the only way to succeed - or, sometimes, survive (Pijpers, 2017).

The miners are not the only market actors engaged in this effort of building trust relationships. Every actor in the diamond supply chain is constantly alert, building relationships, and strengthening their position in the system, hoping to find themselves at the right time and the right place when a 'big stone' is found. This is why the middlemen often offer small amounts of money to the miners and regularly visit the mining pits; creating a strong personal bond with them, they will be at the forefront when one of them finds a valuable diamond (Engwicht, 2018a). In a similar way, the dealers and exporters spend most of their time honing their social networks, promising support and cash to middlemen in order to make them grateful and, therefore, loyal (ibid.).

Overall the system emerges as an extended patron-client network, with an oligopoly of large exporters exerting control over the chain (Haufler, 2009). The fact that financial dependencies are wide-spread and take exploitative form is even acknowledged by the government (National Mineral Agency, 2018, p. 23). Our more critical interview partners described the system as "similar to the one of a mafia" (Oxfam, personal interview, March 22, 2019). In this account the exporters not only finance miners and dealers but also establish close relationships with the paramount chiefs, who ensure that the diamonds go to a specific exporter, even if he has never provided support for the work in the mine. In an interview, a local activist, engaged in a Local Mining Monitoring Group (LMMG), a project financed by Oxfam, recounted how a paramount chief had covered an operation of illicit mining:

> There is a present 27 carat alleged theft case in this town and the alleged person was here in this town. He claimed that he was not mining here but we later found him here, and the paramount chief sent a letter to the local chief to stay out of this business, and when he was questioned about it he claimed it was only 9 carat but he had no licence whatsoever. So, some of these authorities engage in illicit mining, so they will also support it. (LMMG Member, personal interview, March 21, 2019)

The characteristic structure of the client-patron network shows itself in the miner-supporter relationship in the mines, but also in the relationships between supporters and dealers, brokers and dealers, and dealers and exporters. Most of the time, the supporter is himself dependent on a dealer to whom he brings every diamond found in the field. This implies that, in the event that the dealer finds out that the supporter is selling the diamond to someone else, he "will have to pay for that" (DDI, personal interview, March 22, 2019).

The same applies to the *banabana*. The entire value chain is based on a trust-based system in which the reputation depends on the length an actor is in the business (D'Angelo, 2014). The brokers who we interviewed in Koidu affirmed that, since they hold a percentage of the revenues,

they always sell the diamonds to the dealer offering the highest price (Brokers, personal interview, March 21, 2019). However, there is ample evidence to support the thesis that the unlicensed brokers work for a specific dealer in most cases (Engwicht, 2017, p. 15). Research conducted by Oxfam and the DDI suggests that whenever such a broker is about to buy a diamond, the dealer explicitly states in advance how much he is ready to pay per carat for that kind of diamond (DDI and Oxfam, personal interview, March 22, 2019). If the *banabana* invest too much in a diamond and the dealer is only willing to pay a lower price for it, then it is the broker's business. The fact that the *banabana* do not hold a licence on their own and are often financially vulnerable themselves makes them highly dependent on the dealers.

The dealers, finally, are often under constraints of either formal contracts or favour-based dependencies on exporters. As only a small number of exporters has proven to be capable of permanent economic survival, and only exporters are allowed to sell the diamonds outside the country, the dealers are highly dependent on them as well (ibid.). Even more so with the current dwindling supply of diamonds from the fields (Ministry of Mines, personal interview, March 19, 2019) and a polishing industry that is almost exclusively located in India (De Beers Group, 2018).

Against this background, it is possible to recognize the complexity and adversity of this market, in which the actors necessarily need some form of protection independently of the position they hold. Indeed, it is widely accepted that success depends, above all, on the alliance with "someone that is strong in terms of legitimacy, money and position in the industry" (Oxfam, personal interview, March 22, 2019).

In summary, the structure of the whole diamond value chain in Sierra Leone emerges as oligopolistic: the supporters are most of the time brokers, who work for dealers, who in turn are dependent on a few export houses. Every time a diamond is found in a mine, the broker has certain price instructions for that gem from the dealer, who in turn has instructions from the exporter. With the additional reliance on trust and reputation and a political system that is largely supporting this arrangement of dependencies, this patronage system is deeply ingrained in the current structure of the artisanal diamond value chain in Sierra Leone.

Legality and Legitimacy

When analysts address the illegal diamond trade, there is often an assumption of a weak state that cannot enforce its own regulations (Engwicht, 2017). In spite of the recent institutional reforms,

the Sierra Leonean government agencies often do not have the resources to check the compliance with the regulations in the mining fields (National Mineral Agency, 2018). Apart from a low number of officers in general, these officers often do not have the means of transportation to supervise remote mining locations or mobile phones to call for backup (Engwicht, 2018b; Partnership Africa Canada and Global Witness, 2004). However, while it is true that the lack of proper equipment has always been an important shortcoming for effective monitoring of the value chain, it is not the sole reason for a lack of compliance.

Informed by Engwicht's research on legality and legitimacy in the Sierra Leonean diamond market, a picture emerges in which illegal mining is socially legitimate in Sierra Leone and, therefore, often tolerated (Engwicht, 2018b; Thompson and Potter, 1997). In other words, an explanation for the lack of effective monitoring needs to take into account that "the relationship between the illegal market and the state is shaped decisively by norms of appropriateness" (Engwicht, 2017, p. 199). This means that the state agents are most of the times not unable, but rather unwilling to sanction illicit diamond mining and trade.

Consequently, we believe that it is advisable to conduct an analysis of what is considered appropriate social behaviour in the Sierra Leonean diamond sector before we continue. There is no place where the social dynamics regulating the diamond sector are more visible than in the Open Yai market in Koidu city. This is the market where diamonds are illegally bought and sold, where the *banabana* attract the miners and create networks with the dealers (Engwicht, 2017). When we went there for a meeting with a group of *banabana*, we were surprised to find out that the location of the market is of common knowledge and the names of its members well known - as a matter of fact, there are signs indicating names and telephone numbers of the *banabana*, the illegal middlemen (Engwicht, 2018a b).

The NMA officers are themselves fully aware of the existence of the Open Yai market. As reported by Engwicht, the only condition laid down by the officers is that the *banabana* cannot handle diamonds while they are near the market (ibid.). She reports an incident in which one officer saw a *banabana* valuing diamonds while he was inspecting the market: "he exclaimed bemused: 'You are not supposed to play with diamonds!'" (loc.cit., p. 477). The relationship between the state agents and the *banabana* is, therefore, based on collaboration rather than conflict. As described by one *banabana*: "'we are working in partnership. There is no disturbing. We are working

amicably. We have no problem with them. Likewise, they have no problem with us. They are our brothers'" (ibid.).

The NMA officers are not only tolerating the activities of the *banabana* in the Open Yai market, they are also unwilling to penalize the miners working in unlicensed mines (ibid.). For this reason, they rarely arrest them but at most, seize their mining tools. However, this leniency on the part of the state actors cannot only be explained by the norms of collaboration. The toleration of illicit activities is also dependant on corruption, since *banabana* and unlicenced miners, reportedly, pay the state officers for turning a blind eye on their activities (Partnership Africa Canada and Global Witness, 2004). However, these payments are not described as bribes but rather as a 'monetary greeting', a 'thank you' for their service (Engwicht, 2018b). The difference in the definitions of what is clearly corruption could appear trivial, a mere moral justification, but it also sheds light on the peculiar nature of these relationships. The rationale for justifying corruption is that the officials do not earn a living wage. In fact, recent research by Engwicht shows that "the regional mines officers reported that their salaries – if they were paid – were at roughly US$ 50 per month, which hardly covered the cost of rice for their households" (loc.cit., p. 473) . As if that wasn't enough, she also found that some NMA officers in the Kono district went unpaid for periods as long as 16 months. Since they are chronically underpaid or not paid at all by the government, these officers are willing to accept support from *banabana* and miners in the form of bribes, in exchange for turning a blind eye. Engwicht quotes two state officers saying that "'the Mines Ministry is responsible to bring revenue in this country, but we have a low salary. We can only live through catering from the miners who hand us money. (...) [The miners also give us] a little bit of money, because our salaries are too small. Without them, we could never survive'" (ibid.). In this context, bribes are conceived as moral obligations and are, thus, socially legitimate.

It would, therefore, be too simplistic to define this kind of corruption as the behaviour of NMA officers deviating from the legal norms in order to enrich themselves. As described in the previous chapter, the value chain actors are embedded in a patronage system in which rights and duties are governed by customary norms, and where solidarity is a vital social value (Pijpers, 2017). In a similar context, the "control of behavior is exercised through a sense of reciprocity that links an individual's social and emotional rewards with fulfillment of his obligations to the group" (Thompson and Potter, 1997, p. 141).

For this reason, the payments made by miners and *banabana* to the government officers, viewed as corrupt from a legal perspective, are at the same time acceptable and legitimate according to the cultural norms. The adjustment of the traditional norms to the legal regulations has been slow in Sierra Leone, presumably because of the strong influence of patronage networks. Whatever the reason, these contradictions and anomalies impede effective law enforcement in the diamond sector (Thompson and Potter, 1997). Even if the mines monitoring officials were to encounter illegal activities in their day-to-day work, they would, presumably, choose to tolerate them, if they shared a history of reciprocal behaviour with the illegal actors (Dieckmann, 2011). Along the lines of the patronage system, "a mines monitoring officer that has in the past received financial aid from a diamond dealer is unlikely to press for strict law enforcement when noticing irregularities in the same dealer's paperwork" (Engwicht, 2018b, p. 477). This means that the auditing system often becomes a pro forma since the regulations are overruled by the power relations and the social norms that characterise the Sierra Leonean society (Thompson and Potter, 1997).

Another clear example of the shared norms of appropriateness allowing the illegal trade of diamonds is the 'gentlemen's agreement' between the legal exporters and the Ministry of Mines (Engwicht, 2017). Since the Minerals and Mines Act states that every single diamond has to be paired with the documentation for its sale along the supply chain, it should be easy to detect illegal trading by simply checking for the missing information and listed licences in the records. However, the reality often deviates from this ideal. The Government Gold and Diamond Office in Freetown normally allows the exporters "to leave a blank space where they would have to record the licence number of the seller when presenting their goods for exportation" (Engwicht, 2017, p. 206) and this means that the state usually tolerates the legalization of illicit diamonds. This is not an isolated case. The participants of the diamond supply chain report that there are many ways to forge the records and that buyers can buy the licence number for the diamonds that come without documentation from a friend or colleague (Engwicht, 2017; DDI, personal interview, March 22, 2019).

Lastly, mines monitoring officers often employ a moral discourse to justify their non-intervention. In their perspective, it would be immoral to arrest the unlicensed diamond miners since they rely on artisanal mining for their own subsistence (Engwicht, 2018b). Therefore, as long as unlicensed miners and dealers follow certain rules, local governance actors tend to exert their discretionary power and do not seek a strict enforcement of the formal rule. The essential rule that no

actor should break is to never smuggle diamonds, since it deprives the state from much needed tax income and it is, therefore, widely considered immoral (ibid.).

With all this in mind, we agree with Engwicht that "even if law-enforcing institutions were better equipped to detect illegal activity and corruption were prosecuted, illegal market practices would still be tolerated as long as they are commonly regarded as rightful" (Engwicht, 2017, p. 208).

To sum this chapter up, we have seen the elaborate legal framework that Sierra Leone employs to stay in compliance with the Kimberley Process Certification Scheme. Legally speaking, no actor that does not own a licence should handle any diamond in the country. This system is designed to ensure that the origins of a diamond can always be determined and to prevent smuggling. However, we also saw that the system is not reliable. Several actors, especially the *banabana*, do not appear in the official framework for diamond trading but occupy an important position in the value chain anyway. Additionally, many workarounds exist in which licences are left empty or information is filled in that is untruthful. More than the legal rule, social norms of appropriateness and reciprocity apply throughout the value chain and its regulatory agencies.

Chapter 2 - The *Value* Chain

We have now seen a sketch of the different actors that take part in the artisanal mining chain of Sierra Leone. We have touched upon the social relations between the actors and given some indications on why the system sustains itself. We will pick up on the latter question in the next chapter. As we outlined in the beginning, once we established an understanding of the field, we began to encounter certain paradoxes. Before we get into deeper questions concerning the motivations of some of the actors along the chain, we will have a closer look at the object we are dealing with, namely the diamond. We want to explore the diamond itself, as its own entity. For this, we will begin with the fundamental question of where the diamond's value lies.

Diamonds and Value

We will start our investigation with a curious insight: diamonds are extremely valuable. A 1-carat diamond listed as "ideal" in cutting, with a transparent colour ("D"), and a clarity of "VS1" (near perfect) can fetch around 7000$ as of this writing[3]. Considering that one carat is equal to 0.2 grams, this means that one gram of such a diamond is worth approximately 35000$. We are so used to the idea that diamonds are valuable that an obvious question might elude us: Why is that? Why are diamonds so valuable that one gram of them could buy us a brand-new car? One would think that they must be amazingly useful, if they fetch such a high price. Yet, obviously, we know that this is not the case. To put it in the words of Adam Smith:

> Nothing is more useful than water: but it will purchase scarce any thing; scarce any thing can be had in exchange for it. A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it. (Smith, 1976, p. 44 f.)

This is the famous diamond-paradox: we have a good that seems to be rather useless, yet it is fantastically valuable. You cannot drink or eat a diamond, it will not transport you or help you to survive in the wilderness, you cannot make your life easier in any obvious way with a diamond, and yet one gram of it is more valuable than any meal and a considerable number of cars.

However, after some research, it became clear that the paradox gets even worse: synthetic methods for producing high quality diamonds are now available and these diamonds are so similar

[3] Price taken from: https://www.brilliantearth.com/loose-diamonds/search/, 26.04.2019 (16:06).

to natural stones that even experts cannot distinguish them from each other without special machines (Jamasmie, 2018a). Yet, synthetic diamonds are significantly less valuable than their natural counterparts:

Figure 4 - ("De Beers dangles synthetic diamonds in front of consumers," 2019).

How is this possible? The same useless object is not only very expensive, it also varies in price, depending on how it was created, even if the way it was created has no influence whatsoever on the way it may be used. What is more, the cheaper product has not pushed the more expensive one out of the market, even though their use value is identical. Yet, at the time of this writing natural gemstones are still listed for around 7000$ per carat (see above), where synthetic stones with identical cutting, colour, and clarity are worth only 3700$[4]. We see a margin of almost 50% between the two and this trend is expected to increase even further, now that De Beers, the largest diamond trader in the world, has entered the market for synthetic diamonds (Jamasmie, 2018b).

[4] Price taken from: https://www.brilliantearth.com/lab-diamonds-search/, 26.04.2018 (16:06) Cutting: Ideal; Colour: D; Clarity: VS1.

What is it, thus, that gives diamonds their value? Why does a diamond have a higher price when it is extracted from the ground and not produced synthetically? Classical Economists, where we define "classical economics" as the economic school from Adam Smith to Karl Marx[5], spent considerable effort on unravelling the mystery of value. At the heart of classical economic thought, we find the following distinction:

> The word VALUE [sic], it is to be observed, has two different meanings, and sometimes expresses the utility of some particular object, and sometimes the power of purchasing other goods which the possession of that object conveys. The one may be called 'value-in-use' the other 'value-in-exchange'(Smith, 1976, p. 44).

Hence, classical economists recognized the difference between what an object can be used for, and what it can be exchanged for, i.e. its price or purchasing power. The question that drove these economists was thus: what is the real value of a commodity and why is this real value not always the same as its price/exchange value?

Both Smith and Marx rely on the labour theory of value, which, broadly summarized, means that a commodity gets its underlying value from the labour that is exerted to create this commodity: "We know that the value of each commodity is determined by the quantum of labour that was materialized in [generating] its use-value"[6] (Marx, 2009, p. 188). Now, taking another step back, we might brazenly ask: why should we worry about the 'real' value of any commodity? Why don't we just take the price of a commodity and say that whatever the price is, is indeed also its value? This is the predominant approach in modern neoclassical economic thinking. Literally, on the first page of the compiler for microeconomics of the very academic institution this thesis is written for, it says: "Microeconomics is often called *price theory* to emphasize the important role that prices play" (Christensen and Rasmussen, 2013, p. 1 emphasis in original). We might add: 'and it is not called *value theory*, because value does not play an important role in it'.

Neoclassical economics essentially 'brackets' the value question in order to focus our attention on how it is represented in the market[7]. In other words, the question of intrinsic value of an object does not matter for neoclassical economy; what matters is how an object is priced. The 'real' value of a commodity is neither accessible to us, nor particularly interesting in this regard. The final nail in the coffin of the concept of 'real' value comes with the invention of the efficient

[5] Marx describes his own theory of value and money as a "necessary advancement of the Smith- Riccardonian teachings" (Marx, 2009, p. 42).
[6] All quotes from Marx in this chapter are based on the original German version and are translated by the authors.
[7] Much the same way how Edmund Husserl famously proposed to "bracket" metaphysical questions in order to focus on the content of our experience, when he developed the concept of Phenomenology (Smith, 2013).

market hypothesis through which the gap between price and value is closed entirely. Its proponents simply assume that the market knows what the real value of any commodity is (Bjerg, 2016; Malkiel and Fama, 1970). Whatever the market pays for a good *is* the real value of that good. In short, where classical economy asks "is the price right?", neoclassical economy affirms "the price is right!".

This paper is not a critique of neoclassical economics (at least not primarily), nor of the labour-theory of value. Instead we want to use these theories to draw attention to two things: Firstly, value *does* matter. Price and value are not the same and simply bracketing it out, like neoclassical economy is doing, blinds us for some of the mechanisms that influence the market. In the move from classical to neoclassical economy we lost something, and this loss explains for at least some of the puzzlements lingering in neoclassical theory today. Secondly, classical economists have not solved the puzzle of value. The labour theory of value is not sufficient to explain what the value of a commodity is. Rather the history of classical economy can be read as a failure to define what value is (Bjerg, 2016).

We can exemplify the answer of classical economics to the diamond-paradox with Marx: "Diamonds occur rarely in the earth's crust thus finding them takes a large amount of working time on average" (Marx, 2009, p. 54). The value of diamonds, in this account, is deduced from the time it takes to find diamonds. As miners have to proceed randomly, much of their labour is in vain before they finally find a stone. This labour is fruitless but unavoidable for finding diamonds, hence, it is calculated into the final price and this is why diamonds are so expensive.

While plausible on first sight, a closer inspection makes it apparent that this cannot be the (sole) reason for the diamond's value. G. Ariovich subjects diamond pricing to a neoclassical analysis in his paper *The Economics of Diamond Price Movements*. In his research, he comes to the conclusion that the original cost of mining makes up barely 10% of the final cost of a diamond. Considering the miners' wages that we saw in our description above, this is hardly surprising.

Table 1: Markups on Gemstones

Stage of distribution	Markup (%)	Average value of 0.5 carat gem ($/carat)
Cost of mining		60
Mine sales	67	100
Dealers of rough gems	20	120
Cutting units	100	240
Wholesale dealers	15	276
Retail	100	552

Figure 5 - (Ariovich, 1985).

So where does the diamond's value come from according to Ariovich? As we would expect from a neoclassical analysis, Ariovich primarily looks at supply and demand factors to determine the price of diamonds. He distinguishes three separate market segments for diamonds: industrial, jewellery, and investment. In his analysis, he demonstrates that all three sectors are influenced by different demand factors and consequently have different price cycles. Industrial diamonds, for instance, are primarily used for abrasive purposes (Olson and Brioche, 2018). Thus, industrial diamonds vary in price according to economic output. Jewellery diamonds, on the other hand, vary according to disposable income. In other words, this means that people will spend more on jewellery and buy bigger diamonds, when they have more money at their disposal. Finally, investment diamonds are mostly correlated with monetary and financial factors that influence portfolio considerations, like inflation, central bank policy, etc. (Ariovich, 1985).

We can transfer these findings directly to synthetic and natural gemstones because, while at Ariovich's time of writing 91% of industrial gemstones were synthetic, today 98% are. Interestingly enough, the exact reverse is true for the jewellery market: 98% of diamonds used for jewellery are mined while only 2% are lab-made. At the time of Ariovich's writing this made sense, because synthetic diamonds had properties equal to natural ones when it came to industrial applications (hardness, chemical resistance, thermal conductivity) but lacked their visual quality (Olson and Brioche, 2018). They were often of brown colour and lacked both their brilliance and fire, where brilliance "can be thought of as brightness and scintillation; small flashes of bright white light", while fire "is the dispersion of white light into rainbow colors as a result of refraction"(Boyne, 2018). Brilliance and fire therefore refer to the different kinds of sparkling within the diamond. With the development of new synthetic techniques this discrepancy has vanished. Yet,

the different usage has proven remarkably persistent, and analysts expect a growth of synthetic diamonds in the jewellery industry to only 5% within the next 20 years (Onstad, 2018).

Global Diamond Supply by Application

2013 Estimates (in million carats)

Gem Quality (Jewelry Application)		
Mine Production	30 ct.	92%
Synthetic Production	**<1**	**2%**
Recycled/buy-backs (polished)	2	6%
Total	*33*	*100%*
Industrial/Bort Quality (Abrasive Application)		
Mine Production	100 ct.	2%
Synthetic Production	**4,500**	**98%**
Recycled/buy-backs	N/A (consumed)	0%
Total	*4,600*	*100%*

Figure 6 - (Zimnisky, 2013).

This leads us to the conclusion that Ariovich's prediction about diamonds for industrial use was correct when he argued that "further price decreases can be expected over this decade, as the synthetic diamonds market will become more competitive, [...] new producers will enter this market, and, together with further technological developments, it is likely that both the price of grit and stones will drop," (Ariovich, 1985, p. 238). However, his analysis offers no indication why this trend does not extend to jewellery diamonds. Other economists have pointed to a dwindling supply of natural diamonds to explain their continuous increase in price (Read and Janse, 2009). Yet, this still does not explain why natural diamonds are not simply substituted with synthetic ones.

The problem of neoclassical analyses of this and other cases lies in the fact that they do not answer where demand comes from in the first place. Both analyses we mentioned fail to provide a reason why customers desire diamonds in the first place. In short, the question they do not answer is: wherein lies the *value* of a diamond for the customer?

In the subsequent chapter we will elaborate on this question in order to find an answer to this puzzle. However, before we start looking more closely on the single steps of the value chain, we would like to propose a thought experiment: consider the following lyrics of the theme song *Diamonds Are Forever* from the James Bond movie from 1971 with the same name:

Diamonds are forever, they are all I need to please me

They can stimulate and tease me

They won't leave in the night

I've no fear that they might desert me

Diamonds are forever, hold one up and then caress it
Touch it, stroke it and undress it
I can see ev'ry part, nothing hides in the heart to hurt me
I don't need love, for what good will love do me?
Diamonds never lie to me
For when love's gone, they'll lustre on
Diamonds are forever, sparkling round my little finger
Unlike men, the diamonds linger

As you can see, the song conjures up an intricate connection between love, beauty, and eternity on the one hand and diamonds on the other hand. The question we would like to pose is the following: without knowing any context, what type of diamond do you think this song was inspired by; natural or synthetic diamonds? Is a synthetic diamond "forever"? Does it represent love in the same way as a natural diamond? Despite having virtually the same use-value and looking so similar that they cannot be told apart, other than by experts with special tools, it seems to us that the image of love and eternity is reserved for the natural gemstone. In the following, we want to develop a framework that can explain why this is the case. We believe that the difference in price between synthetic diamonds and natural diamonds stems from the fantasies that one can inspire, while the other cannot. It is, in our opinion, not a mere marketing trick that connects natural diamonds with love and eternity, while synthetic diamonds are excluded from this imagery. It is, on the contrary, inherent in the diamonds' very composition.

As we were analysing the paradox surrounding the value of diamonds, we realized that a very fruitful conceptual framework to analyse fantasy and its effects is Slavoj Žižek's. As will become apparent in this chapter, Žižek's thought is heavily influenced by his reading of French psychoanalyst Jacques Lacan. In his work, Žižek expands the usage of Lacan's framework beyond the psychoanalytic treatment of patients to a variety of topics and gives us a very useful framework for the analysis of the unique aspects of diamonds, especially natural ones. We will therefore use Žižek's development of Lacanian theory to elaborate on our understanding of the diamond while it moves along the value chain.

The Diamond as Gift

"*Consider the gift. Giving should be an event. It has to come as a surprise, from the other or to the other; it has to extend beyond the confines of the economic circle of exchange*" (Derrida, 2008, p. 448)

As we were describing in the previous chapter, the artisanal diamond value chain begins with the diggers who dig the diamonds out of the ground. This stage is potentially the most interesting of the entire chain. How do we describe the diamond at this stage? The diamond is not yet visible, it is hidden in the ground and belongs to nature, in all respects. We cannot accurately describe it as a commodity at this stage. As Marx points out, a commodity is something that is produced; something that human labour has gone into: "A thing can have use-value, without having [exchange] value [whereas a commodity has both]. This is the case, when the use for man is not mediated by work" (Marx, 2009, p. 54 f.). But no human has crafted the diamond that the miners find in the earth. It is not an object of trade either. The miners do not trade the diamond with the earth. No, at this stage the most accurate description of the diamond is that of a gift received from nature.

For Derrida the true gift is an event. It is something that is surprising and does not entail reciprocity but is an act of pure giving. Therefore, the usual Western ritual of exchanging presents on Christmas or birthdays does not constitute an act of gift giving according to Derrida. These presents are given with an expectation of reciprocity and are not particularly surprising. On the contrary, you would probably be surprised if your partner did not get you anything for your birthday. This ritual is, therefore, not really an act of gift giving but rather an economy of presents. You give your partner a necklace, she buys you a watch. You give your sister a journey to Serbia, she buys you a trip to Albania. The present is always circulating between the parties and they always roughly cancel each other out in terms of value. Contrast this with the example one of our lecturers presented to us: one Christmas his two-year-old son gave him a self-made picture as a gift. This took him completely by surprise. He had not expected anything from his two-year-old child. And how could he value this gift? Was it worth more or less than the theatre tickets his wife bought

him? The answer is, of course, that it was neither. It was priceless, something that could not be put into monetary terms. This is what made this present a gift.

We can see the similarities that this example shares with the process of finding a diamond. Many miners describe the event of finding a diamond as shocking, even traumatic (D'Angelo, 2014). The diamond that the miners find is "beyond the confines of the economic circle of exchange", to use Derrida's words (see above). There is nothing the miners can offer the earth in return for the diamond and no guarantee that he will ever find any. As we were discussing earlier, mining in the artisanal sector works in a random fashion. There is no economy in the sense that x hours of work mean y amount of diamonds. No, the finding of the diamond is always surprising, it can happen at any moment or it may not happen at all. Nature did not create the diamond to be traded by humans. Hence, the beginning of the diamond as commodity is located outside the economic trading cycle. As Ole Bjerg puts it: "[g]iving a gift creates a value without a price" (Bjerg, 2016, p. 177). This fits the diamond exactly; it is an object of nature that carries value but is not (yet) subsumed under the logic of the market.

However, as the diamond is not a commodity, it is "beyond the confines of economic exchange," as Derrida put it (see above). Therefore, once the diamond is found, it needs to be transformed from a gift into a commodity, such that it can be traded and enter the world of exchange. How does this shift occur? Shedding light on this question will help us understand the role that fantasy surrounding the diamond plays. In Žižek's treatment of Lacan we find a very similar movement from the individual towards the subject, meaning there is something like a 'true' or 'pre-societal' individuum, which enters into a process and comes out of the process as a subject, i.e. a social agent that can participate in society. Žižek's and Lacan's train of thought is not easily understood. Fortunately, Lacan has developed a set of graphs to illustrate his ideas. Hence, we will start with the first of Lacan's 'graphs of desire' and their interpretation by Žižek. We hope that any passage that remains unclear, may become clearer once we apply it to our own analysis of the diamond value chain.

In the first of a total of four graphs, Lacan depicts the genesis of his now famous 'split subject' marked with the "$", the crossed-out S in the lower left corner.

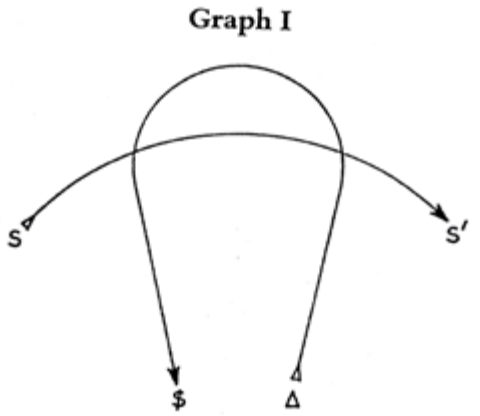

Figure 7 - First Graph of Desire (Lacan as quoted in Žižek, 2008).

His idea, in essence, is that we are all signified by our surrounding social world, whilst at the same time this signification is necessarily incomplete. The process of signification is what is symbolized by the graph from Δ to Ⱪ, whilst the arrow from S to S′ describes the chain of signifiers. Δ marks the "mythical" intention or individuum, before it hits the stream of signifiers. In Lacan's theory this form is denoted as "mythical", because it is not really thought to exist (Žižek, 2008, p. 112). Only a lonely person in the wilderness who is incapable of speech and has nobody around him, could stay in this form. This "mythical" individual is not expressible by language; you cannot describe the 'real' individuum in words.

So, what does this mean, and how does this help us for the discussion of diamonds? When we set out to conduct the analysis of the chain, the similarity between the mythical pre-subject and the natural gemstone struck us. Lacan starts his graph of desire with the mythical pre-intention "Δ". It is an aspect beyond language that needs to be made comprehensible, so that we can integrate it into our social life worlds. This mythical aspect, however, is strikingly present within the natural diamond as well. In Derrida's words: "The event of giving is not something that can be said" (Derrida, 2008, p. 449). The diamond as gift is located firmly in the realm of the mystic. Like with the pre-subjective individuum this diamond belongs to the realm of contradictions, mystique, and occult possibilities. Lorenzo D'Angelo documents his findings on what he calls the "occult economy" of the diamond mining sector as follows:

> According to several miners, diamonds belong to, or are under the control of, invisible beings known as dɛbul dɛn (plural; singular dɛbul) or djinns. In the south-eastern diamondiferous areas of Sierra Leone, there are miners who turn to these invisible presences to increase their chances of finding the precious stones and accumulating extraordinary wealth in a short period of time. Through gifts and ritual offerings, these miners

> hope to minimize the threat posed by such entities and to be reciprocated with diamonds. (D'Angelo, 2014, p. 270)

The diamond, before it is dug out and becomes an object of exchange, is highly ambiguous, mysterious, and hidden. It belongs to the realm of the spiritual and the chaotic sphere of nature, represented by the dɛbul dɛn, who can refer to a variety of spiritual beings and are conflated with the Islamic image of djinn. All of these beings are part of a "hidden world" (loc.cit., p. 281f.), just like the pre-commodified diamond which these entities are thought to possess. In this realm of 'pre-existence', the diamond is susceptible to magic and mysterious powers:

> The luckiest miners may arouse the suspicion that they have actually stolen diamonds by using magical means prepared by ritual specialists (*moriman* or *jujuman*). One of the instruments most often suspected for this kind of theft is the *fana,* a sieve-shaped charm that the miner hides in a pocket and uses to magically transfer by night the diamonds from his fellow workers' heaps to his own. (loc.cit., p. 273)

The order under which these diamonds operate is not the human order of social exchange, and the diamonds do not operate as commodities but as mysterious objects, possessed by fantastic beings which are "holding the order of [...] a world of contradictory possibilities" (loc.cit., p. 287). The logic with which the diamond is generally conceptualized is, thus, not one of language, or equivalence, but one of incomprehensible forces beyond the control of the human network of meaning. As D'Angelo points out, the local miners believe that "[t]he dɛbul dɛn or djinns often behave inexplicably, apparently at random, and sometimes even with malevolence" (loc.cit., p. 284). We can, therefore, clearly see that the diamond indeed appears as 'mythical' to the local miners.

But this status changes during the mining operation. Once the diamond leaves the ground and becomes an actual object, it partially loses its mythical status. As was mentioned above, artisanal mining is not an individual work but a social one. When a miner finds a diamond, the diamond will be inspected by the gang and the supporter. Suddenly, the pre-commodified, mystical diamond enters the social world of exchange. When the object is not used for itself but produced for exchange, it inevitably has to transform its status, from a gift to a commodity. A large part of Marx's work can be interpreted as a description of this switch. One illuminating passage reads: "Whoever satisfies his own needs with his product creates use-value but not commodity. To produce commodity, he must not only produce use-value, but use-value for others, social use-value" (Marx, 2009, p. 55). If the miners were digging up the diamonds only for using them themselves and not for exchange, there would be no transformation. The diamond would remain a pre-commodified good and stay in the realm of a gift from nature or the forces associated with it.

However, we have to look back at Lacan and Žižek to make sense of this switch. When the individuum enters into a social world, it will be marked with certain concepts, put into several boxes, if you will. For example, the authors of this thesis could be signified as "male", "Italian", "German", "students", "lazy" or any number of other signifiers. The graph from S to S' describes the chain of signifiers that are circulating in the social world around us. The process of subjectification happens precisely when the graph from Δ to $ hits the graph from S to S', i.e. when the real individuum is described by the signifiers, and the signifiers start referring to the subject. If, for example, you feel addressed by the words "male" or "female", you have successfully been signified.

The mythical diamond enters the social order in the same fashion. It also has to be signified, to be 'put into boxes'. As D'Angelo puts it: "Each gem is unique [...] - the problem is how to quantify its uniqueness in monetary value" (D'Angelo, 2014, p. 274). Suddenly, the diamond is no longer an inexplicable gift. Instead it is a "one carat", "clear", "white", "oval" diamond. It is, in short, quantified, made comparable to other diamonds. The signification of the diamond makes them quantitatively comparable. This 1-carat diamond is smaller than this 2-carat diamond. This diamond is dotted, this one is clean. Only after it gets quantified, can it be compared and consequently exchanged. Again, Marx puts this very succinctly: "As a use value the linen is a sensually different thing from the skirt, as [exchange] value it is 'skirt-like' and therefore looks like a skirt. This is how it gets a value form that is different from its natural form" (Marx, 2009, p. 65). The same applies to diamonds. We can make sense of this with a graph inspired by Lacan's:

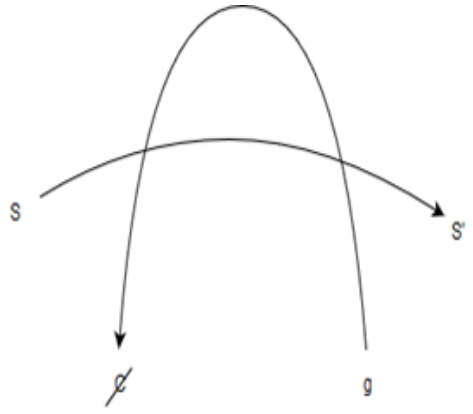

Figure 8 - First Graph of Commodification (own picture).

There is a diamond as pre-commodified gift, which is what we connotate with 'g' and a diamond as exchange value and quantified commodity, which is marked with the ₡. The transformation

from gift to commodity becomes even more clear when we consider that diamonds, after they are dug out, are (imagined as) pure objects for exchange. When we asked the miners we interviewed, three of them wanted to find a gem to buy a house, one of them wanted to go abroad, preferably to Europe (Artisanal Miners, personal interview, March 21, 2019). In this sense, diamonds have no intrinsic value to the miners whatsoever, they are reduced to the quantitative aspect of the money they can get for it. This is further corroborated by another curious insight that D'Angelo documented during his field work:

> During fieldwork in the diamondiferous districts of Sierra Leone, I noticed that miners [...] would maintain that they did not know what diamonds could possibly be used for. When I asked them to envisage the uses of these stones and questioned them about the reasons why so many people were willing to spend enormous amounts of money to possess them, their responses varied considerably. Some believed diamonds were mainly used to make lenses for glasses and windscreens for cars. Among the younger fans of action movies, a rumour circulated that diamonds could be used to build weapons of mass destruction. Others believed that these stones were used to construct technologically complex equipment (for instance, mobile phones or aeroplanes). (D'Angelo, 2014, p. 269)

Again, we can see that the diamond in this stage has changed its status to a pure object of exchange. Something that is only valuable because it can be traded for other things and has no intrinsic use-value. The use-value matters so little that it is largely unknown to the population of miners.

So why are both the subject and the commodity crossed in between? Why does Lacan speak about the 'split subject', and consequently we speak about the 'split commodity'? The reason is that the subject, in order to be a subject, must always reject the symbolic identification as incomplete. There is always also the 'mythical individuum' which cannot be signified. We are the "male", "Italian", "German", "24 years old", "students of philosophy"; however, we also always feel that we are more than this. We are also Δ. For the diamond, the same thing holds true: the diamond enters not as a gift from nature into the miner-supporter or seller-buyer relationship, but as a signified object of "x carat", "y colour", "z clarity", etc. However, like in the case of the subject, the commodity can never be fully signified by its quantification. The 'g' of the diamond, its mythical quality is not lost. Even if we could break the value-body down to the last atom, there would always be something that eludes us, something that cannot be captured, which is its previous status as the "blessing of God" or "gift of the djinn". Again, the "event" of the gift "is not something that can be said" (Derrida, 2008, p. 449). D'Angelo points out that miners are well aware of this ontological duality themselves: "'A diamond is a stone, but also money,' miners would say, thereby emphasizing two aspects of diamonds: their economic significance for the economy of

many miners and their deceptive ontological duality – they are stones and, *at the same time*, money" (D'Angelo, 2014, p. 279). We, thereby, end up with a 'split commodity': a commodity that is signified by the system, while at the same time this signification is not complete.

This, then, is the first step of how a diamond becomes a commodity. In the beginning, it is a gift of nature, a mythical thing in itself that cannot really be grasped or fully conceptualized. It is beyond the confines of economic circulation and can only be approached with certain rituals and semi-religious storytelling and metaphors. Only when the diamond is dug out, it becomes signified, transformed into an object of exchange. When the digger hands over the diamond to the supporter, it is merely the signifiers that matter.

When D'Angelo states that "diamond mining is based on continuous negotiations and compromises between the certain and the uncertain, order and disorder, or the familiar and the alien" (loc.cit., p. 286), we must read it as such that diamond miners are the agents in the chain that transform the diamond from a gift of (mysterious and chaotic) nature to the signified order of social exchange, converting them into commodities in the Marxian sense.

The Diamond and the Market

We have seen the first step in the value chain of Sierra Leone's artisanal diamonds. In this step, the diamond is extracted from the ground by gangs of miners, who are nearly always dependant on a supporter who is financing their operations and provides them with basic necessities like food or rudimentary health care, but in return takes the lion's share from any potential findings. The diamond entered a commodified stage in which it is split between the qualitatively unique 'gift' and its quantification as an object of exchange.

From this stage, the diamond can go on in at least two ways: if the miner sells the diamond to the supporter, the supporter will take it to a dealer in Koidu, which is the provincial capital of the Kono district. This is the official way how the diamond should be traded, as the supporter is also the one who owns the licence. Alternatively, the miner will conceal the diamond from the supporter and sell it to a broker or use that broker to sell it to a dealer himself.

To recapitulate: brokers or *banabana*, as they are often referred to, are mostly locals that the miners trust. They are connected to the work in the fields and keep an eye open for diamonds that were found, which they will either buy and resell themselves or broker to local dealers, depending on their own resources. In the latter case, the miners turn to the brokers because they are

most often ignorant about the potential value that a diamond has. The dealers, who commonly have origins outside Sierra Leone, are considered as less trustworthy than the brokers, who are local men. The brokers will, therefore, go to the dealers with the miner and then broker a deal on their behalf. In return, they are given a certain percentage of the agreed-upon deal.

In this stage of our analysis, the relevant aspect is that, in either case, the appearance of the diamond as an object changes once more. Something curious happens to the diamond on this stage. It may seem so obvious to us that we hardly think about it, but the diamond in this stage becomes comparable to other commodities. It is "more valuable" than iron for example, even though iron and diamonds are completely different things. Once again, it becomes clear that the 'gift' is no longer the predominant nature of the diamond on this stage. You cannot compare two gifts in the same way as you can compare two commodities. Again: a gift in the Derridean sense is inherently an event, an act that is not economic and is thus incomparable. We have already seen how the diamond is signified and thereby loses some of its properties as 'gift from nature'. Yet, this alone is insufficient to make it tradable. What good is it to have a "1-carat" diamond if you do not know what that means? We need a way to make sense of these signifiers, a structure that tells us how to order and compare them, or in the case of the diamond, how to price them.

Fortunately, Lacan was occupied with the same question in relation to subjects: how do subjects construct meaning? We will, thus, have a look on his second graph of desire that deals with precisely this question and utilize our findings to make sense of the diamond:

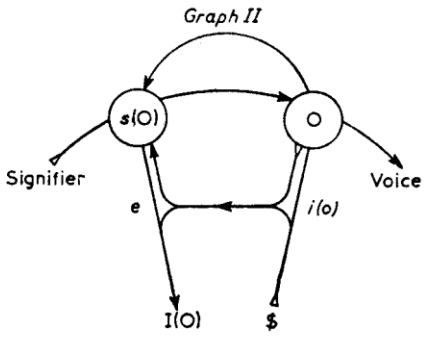

Figure 9 - Second Graph of Desire (Lacan as quoted in Žižek, 2008).

Žižek refers to this stage of the graph as the part that "produces the effect of meaning, with all its internal articulation: the retroactive character of meaning in so far as it is the function of the big Other [...] identification of the subject based on this retroactive production of meaning, and so on" (Žižek, 2008, p. 136). There are, therefore, three major elements which we will look at: Firstly,

the notion of the big Other (O). Secondly, how the big Other structures the signifying chain (S(O)), and lastly how this leads to symbolic identification of the subject with the order of the big Other (I(O)). We will not discuss the role of imaginary ego (e) and imaginary other (i(o)) in this chapter, as they will not play a role in our analysis of commodities.

As we outlined above, the diamond is now signified, but we do not know how to 'read' these signifiers yet. The diamond may be "1 carat", "clear", and "colourless" but how shall we interpret these findings? Is a "clear" diamond desirable or not? If we look at Lacan's thesis of the production of meaning, we can find an answer. In Lacan's framework, subjects always construct meaning through something that is outside themselves. An order that is 'bigger' than they are, which is what Lacan and Žižek call the "big Other". In Žižek's terminology the big Other is the same as a symbolic order as such. It is an abstract notion that is not "real". As Žižek puts it in the title of one of his articles: "The big Other does not exist" (Žižek, 1997a). It is nothing that we can touch or see in and of itself. Yet, it is necessary as an embodiment of the order that it itself creates. As Žižek remarks: "the paradigmatic *structure* exists only in so far as it is itself again embodied in One, in an exceptional singular *element*" (Žižek, 2008, p. 115). As such the big Other can be any particular element that embodies a symbolic order as such: God, Society, the Market, the State, etc.[8]

The big Other is nothing but the logic by which the signifiers operate. It is not the signifiers themselves, but their structure, or their code, the way how these signifiers relate to each other and how they can be read. If the signifiers constitute the vocabulary of the symbolic, then the big Other provides its grammar and syntax. This concept may be hard to grasp, so let us look at an example. Let us say that some of your most meaningful memories are about fishing with your father. The question Lacan was interested in would be: Why do you find these memories meaningful? If you think back honestly, you might even have found these trips boring when you were young and there are probably many other memories you have with your father. So why is it that these memories in particular stick out to you and not any other memory? Žižek's answer would be that you find them meaningful because you have encountered the symbolic order of society. This order structures how the signifier "father" relates to the signifier "son". You encounter the social order of society which

[8] In the following, we will utilize capital letters to indicate when we are talking about a concept in the role of the big Other.

'quilts' the free-floating memories and lets you interpret some of them as an expression of paternal love, whilst ignoring others as irrelevant.

This is not to say that your father did not indeed take you on these trips as an expression of paternal love, but more to say that he chose this form of expression because of the symbolic order you both are immersed in, which regulates the way in which the signifiers "son", "father", and "love" can relate to each other. It is the symbolic order of society, which regulates how this love can be expressed, but also ensures that you as the receiver can interpret it as such. You know that these instances are expressions of love, because the big Other of Society tells you that they are. However, you only become aware of this retroactively, once you have entered and internalized this order. If you were brought up in a different culture with a different symbolic order, the memories of these fishing trips may take on a different meaning or you might forget about them altogether.

The same thing holds true for diamonds. Like the subject, the diamond enters into a symbolic order that makes sense of its signifiers and puts them into relation with each other. Whether a diamond is "more valuable" than iron, or whether a "colourless" diamond is desirable or not is decided within the logic of this symbolic order.

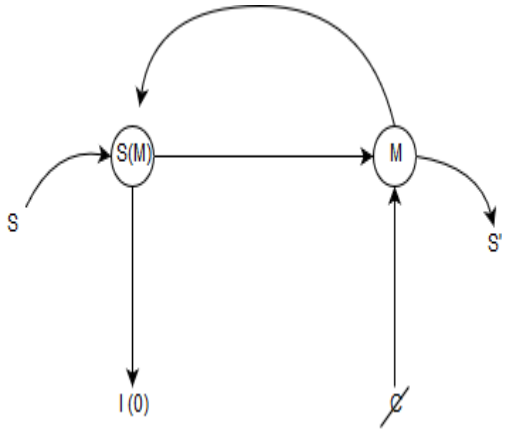

Figure 10 - Second Graph of Commodification (own picture).

In accordance with Lacan's graph, the split commodity, now moved to the lower right, enters the symbolic order of the big Other, which in our case is of course the Market, marked with 'M'. Ole Bjerg has remarked on the function of the Market as the big Other:

> [C]ontrary to ecology, the word 'economy' may stand alone as an entity in itself. This is what happens, when we use economy in sentences such as: 'China's economy is expected to expand at 7¾ per cent this year'; 'Barack Obama is not good for the economy'; or 'the economy does not allow us to lower taxes at the moment.' In this way, we think of the economy as an object or even a subject in itself (Bjerg, 2016, p. 56).

We can, for our purposes, simply replace the word "economy" with "Market" and it will work just as well. The sentence "the Market values this diamond at 7000$" makes perfect sense. It is in this way that the Market comes to function as the big Other, as the symbolic order as such. The Market orders how diamonds come into circulation, how they can be talked about, how they relate to each other, and how they are made sense of. The S(M) denotes how the signifier that is used upon the commodity is a function of the big Other, the Market. Signifiers like "1-carat", "transparent", "oval", etc. appear as signifiers in the logic of the Market and are translated into its language, which is of course price. The fact that we talk about the "carat" of a diamond but not about "time it was found", is because the order of the Market decides which signifiers appear relevant and which do not. The size of the diamond can be translated into price, the time at which it was found can not.

The logic of how the big Other produces meaning is always retroactive, through an assembling of previously encountered signifiers. This is what we saw in the example with your fishing memories. In a commonsensical understanding we would probably say that an order is produced from encountering different elements, but Lacan argues the reverse: the different elements can only take on meaning once we have encountered an order. You do not construct your concept of paternal love by remembering your fishing trips, but precisely because you are given a concept of paternal love, the fishing trips are remembered. Let us use the allegory of a mosaic to make this clearer. Imagine that the signifiers we encounter are like pieces of a mosaic, whereas the big Other, is the picture that we get, once the mosaic is completed. In a commonsensical understanding we might argue that the picture becomes clear once we have completed the mosaic. Lacan, on the other hand, would argue that we can only assemble the mosaic, once we know what picture we try to create.

In the case of diamonds, the retroactive structure becomes clear, once we realize that the fact that the description "1-carat" is meaningful for the diamond but "found at noon" is not, is only because they operate under the logic of the Market. To make this retroactive element clearer, we could imagine a different symbolic order, for example, a religious one. In this hypothetical order, signifiers that are ignored by the logic of the Market, become relevant. For instance, for the religious order it could be important that the diamond was "found at dawn". Suddenly, the "time of finding" surfaces as a meaningful signifier. Nothing has changed about the diamond as such - it is still compressed carbon with the same properties as before. This is what we mean by the retroactive

structure of signifiers. The internal properties of the diamond do not create the Market because they are desirable, but the Market decides which internal properties of the diamond appear as desirable.

In the last step, meaning is produced for the subject by identifying it with certain elements of the big Other and, thereby, entering into its logic of operation. As the subject enters the social realm, it will be identified with some signifying features in the order of the big Other like "wife", "husband", "mother", "father", "student", or "businessman". In the given example, you are identified as "son" in the specific sense that the specific society you are in, endows with this term. Through this identification, you can enter the symbolic order and step into a relation with other elements of the symbolic order. You as "son" can position yourself to your "father" and interpret certain interactions, attributes, or memories as an expression of this relationship. This way, the symbolic order mediates how its elements can relate themselves to each other and how through this relating the subject can produce meaning. We took the example of childhood experiences here, but principally anything follows this logic of meaning and identity production. Attributes, experiences, events, are all integrated into one cohesive, meaningful whole through the symbolic order and the subject must identify with some of these in order to form an identity. This is the main point of this stage of the graph.

So, how is the diamond identified with the Market? The identification I(M) designates from where the diamond is "observed" in the market, and how other commodities "relate to it" (Žižek, 2008, p. 116). The identification within the logic of the market, is what Marx describes as follows:

> Let us further take two commodities, e.g. wheat and iron. Which ever their exchange relation, it is always representable in some equation, in which a set quantum of wheat will be equated to some quantum of iron. What does this equation say? That there is some common of the same dimension existing in both commodities, in one quarter of wheat and equally in one hundredweight of iron. (Marx, 2009, p. 51)

Marx is describing exactly what we are meaning here. This "same dimension" of the commodities is the ordering element that makes it possible to relate them to each other. This ordering element is mediated by the Market. It determines how the commodity identifies with the Market and how the Market speaks to the commodity. In our case, the defining signifier is their price. The Market does not care about what the objects are used for, and "clarity", "weight", and "size" of the commodity matter only insofar as they are relevant for the price. In the logic of the Market, commodities enter only as price, it is only price through which the commodities are comparable to each other, and it is only price for which the Market "asks" the commodity.

At this stage, the diamond is translated into price under the logic of a wider market. In the previous stage, the diamond was already split between its mythical pre-commodified quality, and its quantification as exchange value. Now, this split is further solidified, and the quantification is integrated into the order of the Market. Hence, the diamond operates according to the rules of the Market, which is of course that of supply and demand. It seems, therefore, as if this is the stage where neoclassical theories of exchange can adequately describe the movement of the diamond.

We are not arguing that neoliberal theory is wrong. We do believe that it is incomplete, however. Another look on Žižek and his elaboration of the theory of ideology can help us clarify this point. In his analysis of ideology, Žižek criticises post-structuralist philosophy for ending on this, the second level of the graph of desire. In his words: "The crucial weakness of hitherto '(post)-structuralist' essays in the theory of ideology [...] was to limit themselves to the lower level, to the lower square of Lacan's graph of desire - to aim at grasping the efficiency of an ideology exclusively through the mechanisms of imaginary and symbolic identification. [...] 'Beyond interpellation' is the square of desire, fantasy, lack in the Other and drive pulsating around some unbearable surplus-enjoyment" (Žižek, 2008, p. 139).

Without going into details about the validity of Žižek's critique of Poststructuralism, we can reformulate this criticism to mark our view on the limitations of neoliberal economic theory: 'The crucial weakness of hitherto '(neo)-liberal' theories in the field of economy was to limit themselves to the lower level, to the lower square of our graph of commodification - to aim at grasping the efficiency of an economy exclusively through the mechanism of identification of commodity with price. 'Beyond pricing' is the square of desire, fantasy, lack in the Market and drive pulsating around some unrepresentable surplus-value.'

This "square of desire, fantasy, lack and drive" is therefore what we will look at in the next section of this paper to finally receive an answer to the question why natural diamonds are more valued by the Market than synthetic ones.

The Diamond and Fantasy

In the previous part, we discussed how the diamond is integrated into the symbolic order of the Market and how it is this identification that allows the diamond to relate to other commodities. We have seen how neoclassical analyses have linked certain factors to diamond price movements and

how they differentiate between different market segments. As we have seen, Ariovich links disposable income to diamond prices in the jewellery sector. While certainly technically correct, we have annotated that this analysis is not very illuminating either. In effect, Ariovich simply concludes that if people have more money, they spend a bigger portion of it on diamonds. This leaves the critical question open: why? What drives the demand for diamonds? This leads us back to the considerations from the beginning of the chapter: what makes a diamond such a fascinating object, especially the natural one? Why do we connect it so deeply with notions of eternity and love? "Diamonds are Forever", and "Diamonds are a girl's best friend" as Shirley Bassey and Marilyn Monroe sing to us; but why? Let us look at Lacan and Žižek for the final time to make sense of this mystery.

A decisive, maybe even *the* decisive, feature in Lacan's framework is that the subject is always split and eludes full representation in the symbolic system. This is the entire essence of the 'split' subject. The subject must be integrated into the symbolic order to meaningfully interact with other subjects, but it can never *fully* identify with the signifiers that the big Other assigns to it. Lacan's thesis is that even if there was a full list of all signifiers that apply to an individuum, it would still insist that there is something more to it. Maybe you are a "father", "male", "chef", "Danish", but there is always something *more.* Such a list lacks an element of agency, a "me-ness", or to employ a Christian metaphor; a unique "soul". In Lacanian terms it is the mythical element, which was designated Δ in the first graph of desire (figure 7), and which cannot be expressed by language.

As we outlined before, the mythical subject shares this with the true gift. The gift is an event, something that is outside the normal boundaries of symbolic exchange. The gift as an event is unique, it cannot be symbolically reciprocated, it is singular and defies normal rules of value or price. We also outlined how the natural diamond shares these properties. Every stone is unique, each gem is found randomly, surprisingly, and without anyone that the miners could repay. Finding the diamond defies classical rules of value creation because the diamond is *found* and not *created*. It enters circulation in the Market without the need for anyone to create it, thereby constituting value out of nothing.

Compare this to the synthetic diamond. The synthetic diamond is man-made, meaning it is *created* and not *found*. Unlike the natural gemstone, we can calculate exactly how much electricity,

heat, human labour, etc. was necessary to create it. Let us look at Lacan's final graph and our modification of it to make sense of this:

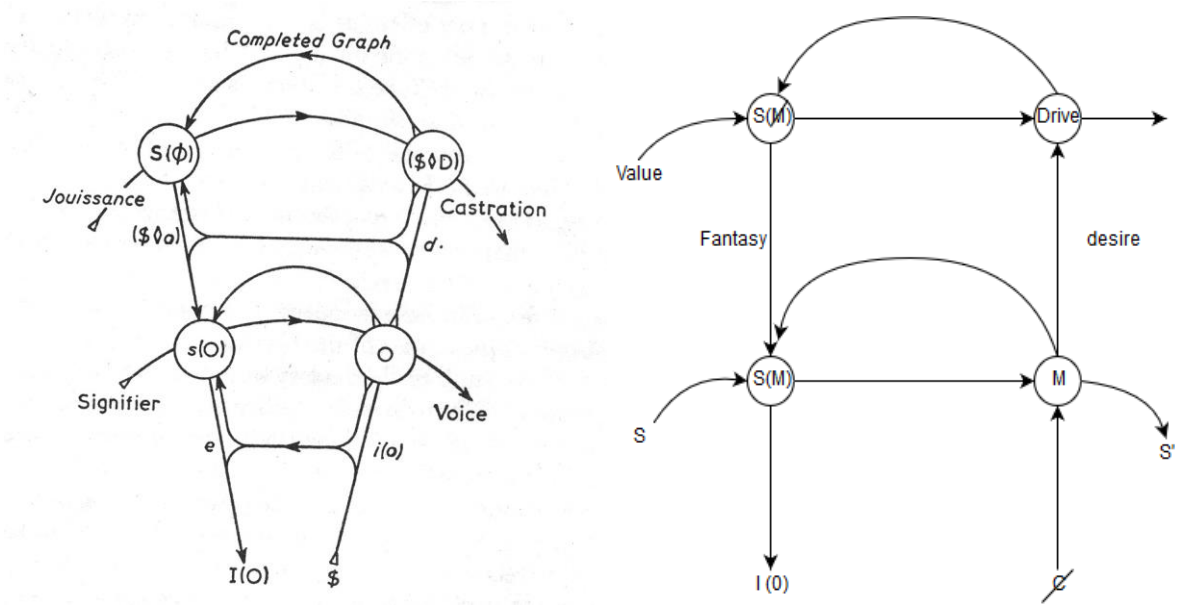

Figure 11 - Completed Graph of Desire (Lacan as quoted in Žižek, 2008) and completed Graph of Commodification (own picture).

The symbolic order assigns the subject certain signifiers, certain "symbolic mandates" as Žižek calls them. Yet, the reason why these specific signifiers are assigned to the subject is inherent in the logic of the big Other. The subject does not choose it; Δ does not play a role in the symbolic assignment of the big Other. As Žižek puts it: "The point is that this mandate is ultimately always arbitrary: since its nature is performative, it cannot be accounted for by reference to the 'real' properties of the subject" (Žižek, 2008, p. 126).

The diamond gets signified and quantified, and subsequently those signifiers are interpreted as a function of the Market and translated into price. Through this identification of the diamond with the symbolic order of the Market, the diamond can be put into relation with other commodities and can be traded. However, just like the subject cannot be completely signified by the big Other, the diamond cannot be fully captured either. In its status as a gift it eludes the representation within the Market. As Bjerg remarks: "Gift giving is the [Lacian] real of economy in the sense that it constitutes an implosion of the conventional rules of economic exchange. [...] The gift is that which 'resists symbolization' through the law of equivalent exchange" (Bjerg, 2016,

pp. 180–181). This dimension is what the upper half of the graph in figure 11 is about: What happens when the big Other is confronted with that which it cannot signify? How does it deal with 'the gift'?

In a way, it is the reverse movement of the lower part of the graph; in the lower graph the diamond as gift cannot be spoken, and it cannot interact with other commodities. It enters the social life world and gets hit by a stream of signifiers, until it is identifiable by the Market. In the upper part of the graph it is the other way around; the symbolic order of the Market must now deal with the gift, the leftover of that which it cannot represent.

In Lacan, whose theory is rooted in psychoanalysis, this pre-symbolic dimension is a stream of (real) enjoyment (*jouissance*). An enjoyment that is not mediated by the big Other. In our case it is the real gift, the gift as an event. In either case, the stream of the real/pre-symbolic of that which resists symbolization breaches the big Other's internal framework. Suddenly, it becomes clear that the big Other, in our case the Market, is internally lacking, too. It does not have all the answers, it does not know everything. On the contrary, the big Other is in itself irrational and paradoxical, just like the subject: "The most radical dimension of Lacanian theory lies [...] in realizing that the big Other, the symbolic order itself, is also *barré,* crossed-out, by a fundamental impossibility, structured around an impossible/traumatic kernel, around a central lack" (Žižek, 2008, p. 137).

This "central lack" at the intersection of real enjoyment and symbolic order is marked with S(Ø), which symbolizes the signifier of the lack in the big Other. This lack is nothing but a negative quantity that assumes positive existence. All that the symbolic order can say about it, is that it cannot speak about it. By causing this failure, however, the lack does have a structural effect.

These considerations are amongst the most difficult concepts of Žižek and Lacan. Think about the lack in the big Other like a hole in your pants. The hole is precisely a lack in your pants. It is nothing in itself, yet through its (non) existence as a negative entity, it gains an ontological status and does have an effect, namely that your pants are now broken. So, if you want to save your pants, something has to be done about the hole. The same applies to the big Other; its failure to accommodate the gift element of the diamond within its framework cannot simply be ignored, something has to be done about it.

However, the aforementioned structural effect is not the break-down of the symbolic order. We need the symbolic order for our social life worlds, such that we can effectively communicate

with each other and create a coherent identity. This is why a new ontological dimension comes into play: the imaginary. To make sense of the internal lack and inherent antagonisms in the big Other, fantasies are created. The role of the fantasy, which is marked with $◊a, is to serve as a "screen concealing this inconsistency" (Žižek, 2008, p. 137). Fantasy saves the coherence of identity construction by transferring the lack that is inherent to the symbolic order onto a given object or entity: "[f]antasy mediates between the formal symbolic structure and the positivity of the objects we encounter in reality: it provides a 'scheme' according to which certain positive objects in reality can function as objects of desire, filling in the empty places opened up by the formal symbolic structure" (Žižek, 2006, p. 40). Think of fantasy the same way you think about patches for the hole in your pants. They repair the image and outwards appearance of the pants by covering the hole. Yet, underneath the patch, the hole has not disappeared. It is still there and removing the patch from the hole would be fatal for the integrity of your pants. The idea for fantasy is similar. It covers the fact that the symbolic order is always built around an internal lack.

The analogy fails at the point of desire. Fantasy always concerns certain objects or elements that occupy the space of the lack in the symbolic structure. These objects are loaded with fantasy and become objects of desire (Žižek, 2008, p. 221). Žižek describes how 'the Jew' becomes the object of desire in fascist ideology (loc.cit., p. 142f.). Fascism as a totalitarian ideology is based on the idea of a harmonious society, a "healthy people". Yet, this symbolic structure is inherently flawed, as societies always deal with inherent contradictions. Rather than acknowledging this, 'the Jew' moves to the space of this antagonism and, thus, turns into a symbolically loaded object of desire. If it wasn't for 'the Jew', the society could be harmonious and would work freely, if it wasn't for 'the Jew' everyone would prosper, etc. The failure of the structure is transferred onto a single element. It is important to note that it is not something inherent in real-world Jews that makes them antagonistic to the symbolic order of fascism; it is rather the space that the idea of 'the Jew' occupies in this network. If it wasn't 'the Jew' it would be 'the Muslim', 'the African', or whoever else. The same logic applies to the Market. The inherent failure of the Market to bring price - a socially quantified category - in accordance with value - an elusive qualitative category - is transferred onto singular objects, which then become objects of desire. 'The gift' enters as such an object of desire for the Market. It moves to the space where the inherent lack of the Market is revealed. Its 'pricelessness' makes it desirable because the Market wants to grasp the element that

gives it this priceless appearance. If the Market could only understand what the gift is, it could bring price and value in order.

With this in mind, we can finally answer the question where the desire for natural diamonds comes from in the first place, and why they are more valuable than their synthetic counterparts. The natural diamond enters the circle as a gift and it most commonly leaves the circle as a gift, as shown in this illustration from a De Beers report:

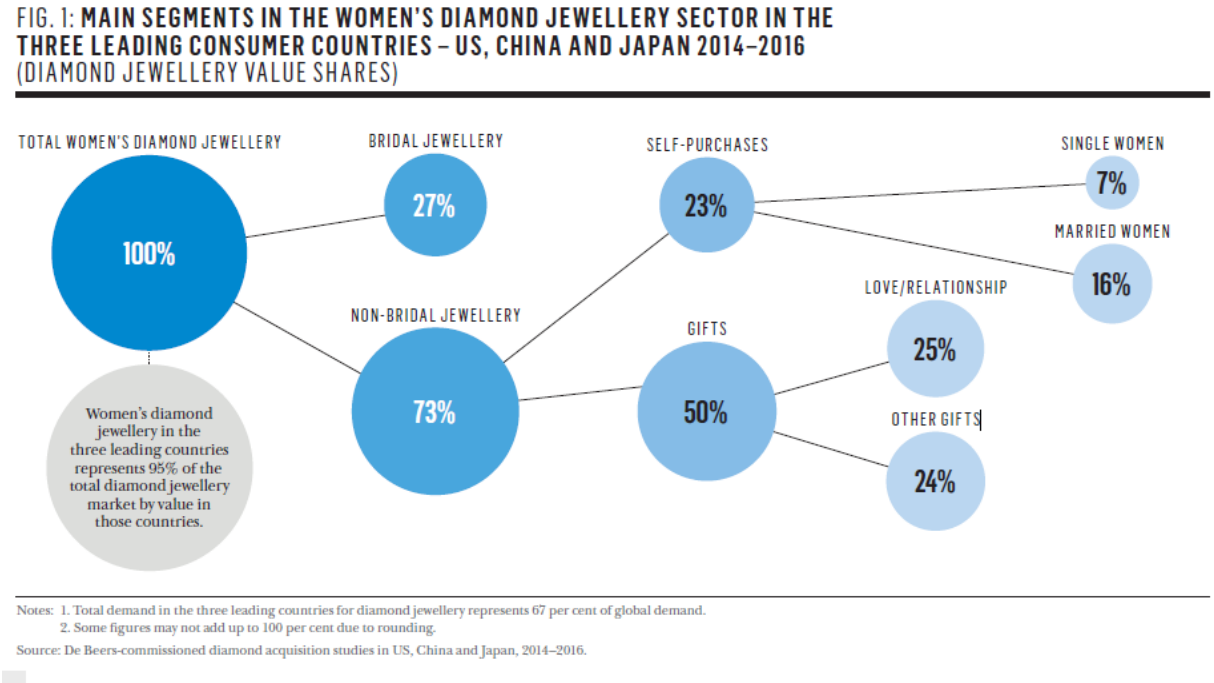

Figure 12 - (De Beers Group, 2017).

With the failure of the big Other to accommodate the gift nature of the diamond, it inspires fantasies like hardly any other commodity. The randomness of the encounter, the uniqueness of the diamond's properties, its longevity, and the incomprehensible amount of time that it was lying in the earth before it was found cannot be priced by the Market. These properties inspire its usage as a gift, in order to recreate these properties and transfer them to the relationship, in which the gift is given. These facets that elude the logic of the Market make the diamond valuable. The gift of the diamond in the form of jewellery is supposed to symbolize the properties of the diamond; like the diamond, the love relationship is supposed to be "forever", "unique", and "unbreakable".

By buying the diamond and handing it over, the relationship is supposed to mirror the image of the diamond; being found seemingly at random but lying in the earth for millions of years already, the love encounter is portrayed as both unlikely and predestined almost from the dawn of time. The fact that the gifted nature of the natural diamond cannot be incorporated into the logic

of the Market leaves room for the same gift properties to be symbolically transferred into the relationship for which the diamond was bought.

It is no coincidence that Lacan's graph shows the fantastic element above the symbolic identification. Symbolic identification happens under the domination of fantasy for subjects, and for the diamond as well. Fantasy is "the a priori space within which the particular effects of signification take place" (Žižek, 2008, p. 138). In Lacanian language we would say that the diamond as a gift is that part of the split commodity that cannot be incorporated into the symbolic order, the Market. Therefore, as a gift it returns to haunt the Market and reveals the Market's internal inconsistency, its inability to encompass all elements of the commodity into its logic. This inability of the Market creates fantasies, which deal with those aspects that the Market cannot encompass. The uniqueness, the fact that it is not produced but found, the fact that it was created over a timeframe that extends beyond our comprehension, the virtually indestructible nature of the material, the randomness and rarity of its finding; all these aspects inspire and require fantasy to make sense of, because the Market cannot truly price uniqueness or timelessness. These fantasies in turn dominate the symbolic identification of the commodity with the Market, i.e. its pricing mechanism. The purest diamond is worth more because it mirrors the purity of the gift. The bigger diamond connotes a bigger commitment. The more unique the diamond, the more unique the relationship. The more fire in the heart of the diamond the more passionate the love, etc.

Compare this to the synthetic diamond. The synthetic diamond is produced and not found. It is created within the symbolic order of the Market. The gift element that eludes the Market is not completely eradicated from the synthetic diamond - in fact, we believe that our analytic framework holds true for any commodity, as any commodity needs raw material from nature. However, it is clear that it is much less pronounced than with the natural diamond. The mystique that surrounds natural diamonds, the fact that there is something about them that "cannot be spoken," to put it in Derrida's words (see above), is missing for the synthetic stone. While the natural diamond is created by forces that 'cannot be signified', forces of nature that worked over millions of years, the forces that create synthetic stones can readily be quantified. Reading through DeBeers' marketing strategy for their new synthetic diamonds, it appears as if they know this very well. Any lab-grown diamond that DeBeers sells through their subsidiary, Lightbox, will carry a permanent laser-inscribed logo at its core, thereby quite literally putting the signification at the heart of the synthetic stone. "Invisible to the naked eye, but easily identified under magnification, the logo will

clearly identify the stone as lab-grown“ (Jamasmie, 2018). Where the origin and pre-commodified state of the natural gemstone is mysterious and cannot be captured, the synthetic diamond is clearly marked and in its very conception signified, the mystical element quite literally lasered out of it. It is clear that the message *qua* gift cannot be the same for the two cases. Where the message for the natural diamond would be: ‘look our love is unique, and mysterious, and cannot even be put into words’, the message for the synthetic diamond would be: ‘look our love looks like it is unique, but actually, if you look at it very closely, it is mass produced and at its heart looks like lots of other love relationships’. Is it then any wonder that the synthetic diamond ends up primarily in industrial uses, while the natural diamond is mostly used for jewellery gifts?

Accordingly, the usual fantasies do not apply to the synthetic diamond. We can clearly see this in the way the company is marketing the new synthetic diamonds: instead of using the ‘diamonds are forever’ slogan, DeBeers markets them as “‘affordable fashion jewellery that may not be forever, but is perfect for right now’” (Danziger, 2018). From a marketing perspective, this seems a clever move and our analysis supports the idea that the market segments of natural and synthetic diamonds will continue to be separated and move independently from each other. The ‘real’ value of the diamond is “the thing to which direct access is not possible” (Žižek, 2006, p. 24). It is something elusive and something that cannot be grasped. The more elusive it is, the more it inspires fantasy. We, therefore, summarize our position thusly: it is not that diamonds inspire fantasies because they are valuable, but they are valuable because they inspire fantasies.

Consequently, the natural gemstone is more valuable than the synthetic one. The fact that we can see exactly where the synthetic diamond comes from and how it was created kills the ‘event’ aspect of the ‘gift’. This is why the knowledge about the origin of the diamond does not benefit the price of synthetic diamonds, as one would expect, taking into consideration that they are undoubtedly ‘ethically cleaner’ than natural gemstones. Rather, it hurts the price. Any intervention in the value chain of natural diamonds must, consequently, take into consideration that it is the gift aspect of the diamond that makes them truly valuable.

Chapter 3 - Finding the Big Stone

Those who, week by week, fail to draw a winning ticket find themselves more and more abandoned and yet addicted to the harsh, asocial way of life of the pits, hoping that yet one more week might result in that big find (Richards, 2001, p. 73).

Our previous analysis showed that differences in price between natural and artificial diamonds derive from the intensity of the fantasies associated with them. The more their 'real' value is elusive and cannot be grasped, the more they inspire fantasies and become valuable as gifts. The Market assigns certain signifiers to the diamond such as "carat", "colour", "clarity"; however, these signifiers are not emerging from the intrinsic properties of the diamond itself and there is no apparent reason why a coloured diamond should be worth less than a white one or vice versa. The fact that one property is valued more than the other is exclusively inherent to the logic of the Market itself. This effectively means that the split commodity is always caught in two different ontological orders at once. Žižek follows Lacan in his postulation of an 'ontological triad' of 'the Real', 'symbolic', and 'imaginary'. Each of the three describes a distinct, irreducible order that cannot be translated into one of the other two (Žižek, 2008). While the big Other, in our case the Market, is part of the symbolic order, the 'g' in our graph is part of the order of the Real.

When Žižek speaks about the Real, it is crucial to understand that the Real in this reading is taken from a psychoanalytical tradition. Žižek takes the notion of the Real from Lacan, and as such the Real is not some underlying neutral, objective truth that we approach. It is not 'the real world'. Instead, the Real in Lacan's tradition must be read as the Real of desire - that is, an underlying trauma that resides in the unconscious and cannot be accessed directly. Due to its location in the unconscious, the Real of our desire is not reality - it is precisely that which *hinders* us from accessing reality objectively (ibid.).

The irregular Real is translated into the symbolic order and in this operation the chaotic nature of the Real is replaced by symbolically recognizable entities. In our case, the diamond is incorporated in the symbolic order and it is thus able to circulate in a structured fashion in the Market, put in relation and traded for other commodities. The diamond gets signified and quantified, and subsequently those signifiers are interpreted as a function of the Market and translated into price.

However, just like the subject cannot be completely signified by the big Other, so the diamond cannot either. The 'mystical' element of the diamond, its qualitative and pre-commodified uniqueness eludes the representation within the Market. In the symbolic universe, the Real is nothing but the signifier of the lack within the big Other (ibid.). All that the symbolic order can say about it, is that it cannot speak about it. In other words, the Real holds a paradoxical position since it is simultaneously inside and outside the symbolic order. Indeed, it represents simultaneously the hard kernel, impossible to penetrate and symbolize, and a chimerical entity, devoid of any ontological consistency. For this reason, the process of symbolization falls short in the attempt of replicating the Real, which remains always equal to itself and inconsistent (ibid.).

How is it possible to make sense of the internal lack, the inherent antagonism in the Big Other? A coherent notion of meaning and identity can be saved only by transferring the lack in the big Other onto a third element. This third element, which acts as the embodiment of the inconsistencies, is what Lacan calls *objet petit a* and Žižek refers to as 'sublime object of desire' (Žižek, 2008, 1997b).

This ontological distinction - the recognition of three distinct, incommensurable dimensions of being - lends itself surprisingly well for describing the economy of desire flourishing in the artisanal diamond mining sector. Indeed, it can be argued that the miners are digging towards this Lacanian Real, the point at which the ordinary symbolic order is circumvented and breaks down. In other words, we propose to conduct an analysis informed by psychoanalytic theory to find an answer to one of the most relevant questions for the NGOs implementing development projects in Sierra Leone: why are the miners participating in the artisanal diamond mining sector?

We were walking in the dusty pathways of a mining area in Kono District when we asked this question to a group of local activists. "Why don't you ask them?", said one of them, indicating a point in the distance surrounded by high heaps of gravel. When we got closer, we realized that it was a mining pit dug by a *gang* of miners, who were standing with pickaxe and shovels in their hands. We descended into the mining pit, making our way on a narrow strip of land to interview them. The miners were four, different ages but the same solid experience in artisanal mining. We asked them when the last time was, they had found a diamond of noticeable size. To our surprise, they admitted that they had never - in many years of intensive labour - found a single diamond that could be sold for a large revenue. One of them was lucky enough to have once found a middle-sized diamond. However, at that time his mining activity was financed by a supporter and he was

obliged to sell him the diamond even though he was not offering him the best price. Furthermore, he was part of a *gang*, and for this reason he had to divide his share with the other members. In the end, he found himself with a small amount, not substantial enough to change his life; indeed, he was soon back to the same mine, performing the same repetitive and tiresome physical labour (Artisanal Miners, personal interview, 21 March, 2019).

This miner is not alone. Data collected by development agencies and the Sierra Leonean government seem to confirm that the yields of artisanal diamond mining are, on average, very meagre; on top of that, even in the unlikely event of a relevant finding, the lucky miner rarely gains enough money for changing his life or starting a new activity (Engwicht, 2018a). Given these premises, many observers concluded that the miners are trapped in poverty and exploitative social relationships (ibid.). To make matters even worse, sensitization campaigns of advocacy groups and NGOs show that artisanal diamond mining is a hazardous activity for the health and safety of the miners (Partnership Africa Canada and Global Witness, 2004).

We are here focusing on a specific anomaly of the artisanal diamond mining: hundreds of thousands of people entered the sector even though the revenue per capita is negligible and they live, most of the time, in extreme hardship (Pijpers, 2014). From a rational economic point of view, it appears as an unsustainable strategy - a report by USAID defines it as an "illusion" (USAID, 2001, p. 5).

Given these premises, the natural question should be: why does the artisanal diamond mining sector exist at all? After all, there are better alternatives for employment in the country. One example is farming: agriculture represents 61 percent of all employment in Sierra Leone (Gonzalez and Gutierrez, 2017) and, although mainly a subsistence activity, it secures the livelihood and autonomy of the farmers (Pijpers, 2014).

Why are so many young men choosing the hard work in the mining pits rather than the work on the farms? It is possible to argue that, if the capital invested in artisanal diamond mining was channelled into the agricultural sector or other productive sectors, the economic development of the country would be accelerated and this would create new jobs (ibid.).

In this section, we will argue that a real understanding of the miners' livelihood choices requires a stronger attention to the role that long-term ambitions and aspirations play in their lives (Engwicht, 2018a; Pijpers, 2014). The underground diamond, elusive and untraceable from our reality, plays the ideological role of 'sublime object of desire' not only for the miners, but for all

the diamond market's actors. The sublime objects, also defined *objet petit a,* have no positive consistency in reality - applying a metaphor by now familiar, the sublime object is the patch on top of the hole in your pants. Analysing the source of gold's value, Žižek observes that "we search in vain in its positive, physical features for that X which makes of it the embodiment of richness" (Žižek, 2008, p. 105). The same goes for diamonds, since we needlessly search among its different features for the one which confers its real value.

In the Lacanian system, it is the Imaginary which has the function of covering the incompatibility, the gap between Real and Symbolic (Žižek, 2008, 1997b). Ingrained into the cultural memory and oral history of the country, artisanal mining is surrounded by a multitude of fantasies since the 1950s, when the diamond deposits were still rich with resources (Pijpers, 2017). Many Sierra Leoneans have family members that worked in the diamond sector at some point in their lives and they have been told anecdotes of big findings and of ordinary miners whose lives changed with the wealth from a single diamond (Engwicht, 2018a). But even today, when an unexpected finding occurs, the story of the lucky miner circulates widely around the country (D'Angelo, 2014). This is what happened when Emmanuel Momoh, a former artisanal miner and petty trader, sold a 709-carat rough diamond which "weighed about the same as a baseball or a D battery" (Reel, 2018). The story of the so-called 'Peace Diamond' reverberated around the country, and outside of formal interviews even our interview partners discussed about this diamond that was sold for $6.5 million at an auction in New York.

The common thread of these stories is the potential of artisanal diamond mining for changing the fate of a life in poverty, opening alternative pathways - not only to the single miner, but also to his descendants (Partnership Africa Canada and Global Witness, 2004). It is a similar prospect that provides the necessary motivation to the miners engaged in the hard work of the mining pits and attracts those seeking a fast upward social mobility, migrating from other regions or neighbouring West African countries (Engwicht, 2018a).

Therefore, the dream of becoming a millionaire through diamond mining is not a simple illusion of unwitting young men, but a collective experience and integral part of the social imaginary (Engwicht, 2018b; Pijpers, 2017). As underlined by Engwicht, "diamonds hold a symbolic value that transcends their material value in that they evoke images of bright futures not just in consumers, but also in market actors along the value chain" (Engwicht, 2018a).

We argue that the creation of this imaginary is determined by the strong non-transparency of the principles of diamond's value creation; accordingly, the surface available for the ideological projections of the actors involved in the diamond supply chain is proportionally large. As described above, amongst many miners the belief circulates that the underground diamonds are controlled by the djinns, supernatural creatures living in the "hidden world" (D'Angelo, 2014). The underground diamonds, semi-mystical in their elusiveness, are therefore transferred into a different reality. Since the access to this reality is difficult and limited to a selected few, many miners want to test in the mining fields if they possess this special ability of access (ibid.). In their perspective, the finding of a 'big stone' is the ultimate evidence that they possess a special intuition, or that they received the grace of the djinns or God (Artisanal Miners, personal interview, March 21, 2019).

We argue that it is necessary to analyse the process of formation of the miners' imaginary in order to understand their livelihood choices and their hope for a better life through diamond mining. The expectations for the future can have a considerable influence on present decisions. Following the definition provided by Pijpers, we look at artisanal diamond mining as an "economy of dreams" (Pijpers, 2017, p. 136), where shared expectations have to be recognized as the driving force of the sector. The decision of the miners to engage in the diamond sector is determined by the expectations and the long-term strategy aiming at the creation of a better future for themselves and their families (Fanthorpe and Maconachie, 2010; Pijpers, 2014).

These expectations are not immutable, given once and for all, but they can be shaped and managed through "politics of expectations" (Engwicht, 2018a, p. 261). However, many attempts of NGOs in influencing the patterns of social behaviour fell short since they understood artisanal mining as an activity driven by short-term strategies, a direct alternative to subsistence activities like farming (Engwicht, 2018a; Pijpers, 2014).

The reality is that miners don't just want a secure living. They want an education for their children and build a house, to emigrate to Europe, or buy a car (Artisanal Miners, personal interview, March 21, 2019). Subsistence farming, in this respect, cannot be attractive especially for young people with big hopes for the future (Fanthorpe and Maconachie, 2010; Pijpers, 2014). It can provide the daily food, but it does not make dreams come true. As the World Bank notes: "Subsistence agriculture employs many but does not provide income to lift people out of poverty." (Gonzalez and Gutierrez, 2017, p. 1). Artisanal mining, on the other hand, even though the chances

of finding the 'big stone' are very small, is essential for the existence of many people since it provides hope for a better future (Pijpers, 2017).

The economy of dreams is, by definition, based on the continuous postponement of the dreams' realization (ibid.). For this reason, an excellent vantage point to analyse the imaginary driving Sierra Leoneans in their livelihood choices is provided by the interviews that Bøås conducted with children working in the diamond mines (Bøås and Hatløy, 2006). Notwithstanding the endless deferment of their dreams and the considerable hardship of the work in the mine, what emerges from this research is that these children have great and vivid hopes for the future. According to this survey, a striking forty-three percent of them want to find the 'big stone' in order to go back to school and continue education, whereas 17 percent dream of the opportunity to find a better job, and 16 percent would go abroad (ibid.). Virtually none of them would continue working in the mining sector, since it is conceived as an activity done for a limited period of time, in order to earn enough money and create opportunities for a better future. They have the concrete hope of "choosing the 'winning' number in the giant raffle of the Sierra Leonean alluvial diamond mining enterprise" (loc.cit., p. 74) and, in this way, open new pathways for their lives, far from the poverty and the struggle for survival.

Some of these miners had been at school for several years when they got "this feeling for diamonds" (loc.cit, p. 75). The impulse of 'striking it rich' in the mining pits encouraged them to quit their education (Partnership Africa Canada and Global Witness, 2004). For two of these child-workers, the stories heard in their communities played an important role in their decision. They had heard of a man living a difficult life, with neither friends nor money as support, but only the repetitive and tiresome labour of the mines. One day, he found a really big diamond. And this single diamond forever changed his life forever. He went to Freetown and settled there as a rich man, conducting a life of luxury and leisure (Bøås and Hatløy, 2006).

This is why these children continue to bet on this activity, despite the fact that the probability of success is negligible; after all, they do not have any other available dream for a better life to rely on. And to make matters worse, even if one day they will find a valuable stone, they do not have the necessary knowledge to evaluate it and, thus, they will probably not benefit from the finding (Engwicht, 2018a; Pijpers, 2017). The dealers have more expertise in valuation and negotiation and can make them believe that the diamond is flawed, of little value (D'Angelo, 2014). Most likely, they will sell it for a small profit (Engwicht, 2018a). For

this reason, as pointed out by Engwicht, "the dream of diamond mining as an exit option from the hopelessness of rural poverty is treacherous (...) even if miners are successful in finding valuable stones, the relationships of knowledge, power and patronage that characterize Sierra Leonean society and the diamond market prevent them from moving up in the world" (Engwicht, 2018a, p. 264). This means that the probability of gaining even moderate wealth through artisanal diamond mining is extremely meagre for the miners.

The miners are aware of the difficulty of finding the 'big stone', but they keep working undeterred - probability theory has only limited relevance to them. A quote from Dostoyevsky's Gambler perfectly reflects the miners' mindset: "True, out of a hundred persons, only one can win (...) yet what business is that of yours or of mine?" (Dostoyevsky as quoted in Bjerg, 2009, p. 430). This is what distinguishes the perspective of the miner from the one of most NGOs. According to scientific probability theory and orthodox economy, the miners' claims that they can influence their own chances of finding a big diamond are obviously erroneous and irrational. However, the main difference is that, while the NGOs assess the probability according to the symbolic order - observing how artisanal diamond mining is not a rational economic strategy since it can trap the miners in a life in poverty - the miners interacts indirectly with the Real. Applying a psychological definition, the beliefs of the miners can be described as 'cognitive distortions' (Bjerg, 2009, p. 431), since they believe to be able to influence the outcomes by persuading the djinns or to be blessed by God (Artisanal Miners, personal interview, March 21, 2019).

There are no reasons to refute the findings of the NGOs. However, we may translate them into a Lacanian perspective by understanding the cognitive distortion as derived from the miner's imaginary or fantasies.

By linking himself to the 'hidden world' of the djinn, to the pure chance of finding a valuable diamond, the miner opens up the symbolic order towards something beyond what may be symbolized. The miners are literally digging their way toward the hidden reality of the underground diamonds, driven by the fantasy that in the Real there is a power "that is able to see in him that which is more than himself, and which no other, including himself, is able to see" (Bjerg, 2009, p. 432). According to the fantasy, mining gives access to something more real than the visible and concrete social reality.

The diamond, in its role as 'sublime object', *objet petit a*, provides fantasmic support to these ideological propositions. It takes time and effort to appropriate a big diamond; while the

miner is digging in the mine, the diamond is always so close and yet so far. Thus, a certain distance between the desiring subject and the object is maintained; according to Žižek, this is a necessary precondition for the maintenance of the object as sublime (Bjerg, 2008). As lack in the symbolic order, the sublime object cannot be approached too closely since "if we go too near it, it loses its sublime features and becomes an ordinary vulgar object and for this reason it can persist only in an interspace, in an intermediate state, viewed from a certain perspective, half-seen" (Žižek, 2008, p. 192).

In the case of diamonds, this interspace is represented by the 'hidden world', ruled by the djinns. Without this strong desire for the diamond, almost unreachable in our reality, the miners would not engage in artisanal diamond mining; indeed, there are better opportunities, for example gold mining, to ensure their livelihood (Partnership Africa Canada and Global Witness, 2004; Pijpers, 2014). However, the gold nugget is not as unique as the diamond gem, the one-of-a-kind, unbreakable stone, and it does not fuel the miners' dreams in a comparable way.

Further support for the thesis that the diamond constitutes a sublime object of desire comes from the lucky miners who tried to describe the moment in which they found the big stone. Because sometimes, though rarely, it happens - the dream comes true. The miner is mechanically washing the gravel in his sieve when his eyes are caught by a spark in the mud. He follows that brightening with his hand, he holds the stone incredulous - the condensation of his dreams at his fingertips.

The market actors describe the moment of the finding of the big diamond as an exhilarating experience, a shock (D'Angelo, 2015b, 2014). The miner sees the 'big stone' coming to him, out of the blue, and, if he will be able to make a good deal, he has just made, in a breath, a winning worth millions of Leones - an amount sufficient to change his life and the one of his descendants.

If we apply the Lacanian perspective, the finding of the diamond can be described as a borderline imaginary experience. The miner is staring directly into the Real of his desire and he suddenly realizes that what he holds in his hand is an ordinary stone, a vulgar object that, nonetheless, is extremely valuable in the reality of the diamond market (Bjerg, 2009). The miner has worked so intensely to penetrate the secret 'behind the curtain' and, now, with this common object right in front of his eyes, he recognizes that there is nothing behind the curtain; the value of the diamond is a symbolically constructed illusion, something ephemeral. According to Lacan, "there is nothing intrinsically sublime in a sublime object" since "a sublime object is an ordinary, everyday object which, quite by chance, finds itself occupying the place of what [Hegel] calls *das Ding*,

the impossible-real object of desire" (Žižek, 2008, p. 221). This means that what the sublime object is masking is not a substantial order but a radical emptiness - that is, its sublimity is related to the place is occupying in the economy of desire and not to intrinsic properties. An ordinary object begins to embody the sublime object of desire as soon as it occupies the 'forbidden', empty space in the Other (ibid.). The diamond finds itself in place of *das Ding* and from that moment a whole set of fantasies is built around it.

The miner cannot describe his encounter with the Real. This borderline imaginary experience is not translatable into words since the Real operates beyond the realm of symbolization, to which language belongs (Bjerg, 2008). The diamond found by the miner is the gift offered by the earth and it does not entail reciprocity: it is a surprising and inexplicable act of pure giving.

The ineffability of the encounter with the Real, the incomprehensible nothingness beyond the curtain, has a profound effect on the miner. He cannot forget what he saw in the mine. After he found out that the value of diamonds is ephemeral, the very fundamental level of fantasy is distorted, and this permanently alienates him from the social reality of the diamond market. He has now experienced how the finding of a diamond is not a sign of personal distinction, the confirmation of a special relationship with the 'hidden world', because the hidden world is itself empty, an illusion covering the lack in the big Other.

This disillusion could explain why, as reported by many researchers, the lucky miners usually spend the money frivolously, for buying luxury goods (Fanthorpe and Maconachie, 2010; Pijpers, 2014). This expenditure pattern, defined by Pijpers as 'hot money'(Pijpers, 2014, p. 36) and by D'Angelo as 'fast money' (D'Angelo, 2014, p. 279), has been present since the first 'diamond rush' in the diamondiferous area in the 1950s, when the mining pits were still full of resources and the rate of lucky miners was considerably higher. One administrative report written by a colonial British official from this era is eloquent in describing this kind of behaviour when it warns about the social risks associated with the artisanal miners that 'hit the jackpot': "the atmosphere prevalent in the diamond mining areas, which was spread by miners returning from them with money to spend and dissolute habits, could not be other than inimical to the traditional restraints of tribal discipline and good order" (Fanthorpe and Maconachie, 2010, p. 263).

The fact that diamonds have a specific social value appears even more starkly when compared to gold. Indeed, the revenues from gold are usually linked to stability, payment of the school fees and sustenance for the household (Pijpers, 2014). The outcome of gold mining is uncertain

just like diamonds, but it provides on average a small regular revenue and minimises the risks compared to diamond mining - in other words, gold provides a type of money that is different from the 'hot money' of diamond mining (Pijpers, 2014, 2011). This argument can be illustrated by the fact that, according to the tradition in Sierra Leone, the sin of misusing the money earned through gold mining results in bad luck for the miner and his entire family (Pijpers, 2014).

Therefore, the quality aspect of these revenues probably influences the miners when they have to decide between diamond and gold mining (ibid.). On the one hand, gold mining provides more stability and minimizes the risks; on the other, the rationale of the 'economy of dreams' suggests betting on the risk-maximizing diamonds.

Therefore, it is hardly surprising that many observers - often, the same market actors who participate in the chain - have compared diamond mining to gambling (D'Angelo, 2015b; Partnership Africa Canada and Global Witness, 2004). Like a lottery, the chances of winning the prize are extremely small but the rewards are so big that it still constitutes an attractive bet for many people. Other authors, like Engwicht, criticize this interpretation of diamond mining as a 'casino economy', not because it is far from reality, but rather observing that "the hard work of diamond miners shares little commonality with the ease and enjoyment that is usually associated with gambling" (Engwicht, 2018a).

Using the framework provided by Bjerg for categorizing gamblers, it is possible to describe the difference between gold and diamond miners defining them respectively as 'ordinary gamblers' and 'problem gamblers' (Bjerg, 2009). As difficult as it may sound to draw a comparison between the two different realities - the 'sweat of the brows' of the diamond mines and the 'fun never stops' of the casino - this framework enables to identify surprising commonalities. On the one end, the gold miner is the 'ordinary gambler' who had "a fun night at the casino, winning some, losing some, but the next day he is back at work in the ordinary reality, and the experience at the casino has affected him no more than a casual dream" (Bjerg, 2009, p. 434). Indeed, the gold miner is, most of the times, also a farmer and he chooses to diversify his activities in order to gain more sources of income (Pijpers, 2014, 2011).

The diamond miner, on the other hand, is the 'problem gambler', obsessed in trying to find the diamond and, once he encounters the sublime object of his desire, thrown out of joint with the

social reality (Bjerg, 2009, 2008). In the latter case, his 'heart changes': he is not interested anymore in the relations of trust with the other actors in the supply chain and, despite having previously planned how to invest the money, he now decides to spend his wealth for ephemeral goods.

As previously described, the miners are not the only ones betting on the next 'big stone'. Indeed, all the actors involved in the diamond supply chain share the same, unrealistic dream. As reported by Engwicht, it is possible to compare diamond mining to an addiction that "prevents miners from moving on to other employment sectors. It drives dealers and exporters to keep their office open all days of the year and their phones turned on and in immediate reach at all hours of the day. It motivates even accomplished dealers and exporters to invest in big and small mining operations alike in the hopes of discovering unmined deposits" (Engwicht, 2018a, p. 263). They all are compulsive gamblers playing the same game. The dream of finding the big diamond is the common thread in their stories and it is this unfulfilled desire that provides dynamism to the artisanal diamond market (Pijpers, 2017).

The diamond miner, just like the 'problem gambler', is disillusioned and does not want to engage in other activities, i.e. farming, gold mining, education. While searching for the diamond, the vivid dream of the sublime object completely consumes the desire for anything else. It becomes instrumental for achieving all other desires and dreams - the proximity of the Real makes him independent of the symbolic reality where most of the Sierra Leoneans live (Bjerg, 2009). Trapped in a spiral of postponed expectations, he is unable to consider alternative livelihoods and to take distance from the reality full of hopes of the diamond market.

Chapter 4 - Transparency as Fantasy

There are a lot of development agencies in Koidu that try to improve the situation surrounding diamond mining. They have worked on reduction of child labour, community development projects, safety and environmental issues, and much more. One paradigm that has emerged as central to the work of most NGOs in the sector is 'transparency', the freedom of citizens to have access to information of public relevance. For instance, a local Oxfam activist told us that transparency is the main need for the local communities, a tool for keeping the authorities accountable (LMMG member, personal interview, March 21, 2019). Additionally, according to most NGOs, the disclosure of information about the diamonds' movements along the supply chain enables to identify the sources of illicit activities and expose them to public opinion (Africa progress panel, 2013). Citizens can, thus, put pressure on policymakers to formalize the diamond market by cutting the middlemen and create a governance framework for the mining sector which benefits society as a whole.

However, as underlined by Engwicht, NGOs should consider that transparency is not a predefined model but rather a principle that needs to be adapted to local norms, customs, and relationships of power (Engwicht, 2018b). Any attempt to change the governance system has to first take into account that the actors are influenced by deeply entrenched social dynamics and that the final outcome can, therefore, be different from the one envisioned by the architects of the initiative. At this point, we are not interested in analysing the scope or limitations of these projects in detail. Rather we want to use the Lacanian framework to penetrate through the formalization desire of the NGOs and, in this way, outline the imaginary space supporting this kind of initiatives.

Žižek argues that the Real does not possess the necessary structure for its own symbolization (Žižek, 2008). This means that, in our case, we never reach a point at which the diamond itself begins to speak and define itself to us. Indeed, "the radical contingency of naming implies an irreducible gap between the Real and modes of its symbolization" (loc.cit., p. 107). Since every symbolization is ultimately contingent, a coherent definition for the diamond can only emerge through the reference to a 'pure' signifier. In other words, the diamond itself does not allow us to speak about it. We need to refer to something else, to a meta-signifier, to make sense of it. 'Con-

flict', 'blood', 'development': there are many signifiers that can potentially be attached to the diamond. It is not the diamond itself, therefore, which provides meaning and unity to the development strategies of NGOs; on the contrary, the 'pure' signifiers are the ones determining their goals and identities.

The practical importance of this recently emerged in all its complexity when civil society organizations uncovered that the export of rough diamonds was still a means for repressive regimes to get funding and to maintain their power (Gooch, 2011; Haufler, 2009; Leggeth, 2011). Hence, they started to challenge the existing narrow definition of 'conflict diamonds', applied by the KPCS, as diamonds mined by rebel groups to finance civil wars (Engwicht, 2018b). In response to the KPCS members inaction and unwillingness to reconsider their criteria for imposing penalties, the non-governmental organisation Global Witness and the advocacy group IMPACT (formerly Partnership Africa Canada) eventually left the scheme (Engwicht, 2018; Haufler, 2009; Leggeth, 2011). As one of these organizations wrote in a farewell letter, the refusal to broaden the definition of 'conflict diamonds' to cover issues of human rights and labour conditions "has turned an international conflict prevention mechanism into a cynical corporate accreditation scheme" (Gooch, 2011).

The civil society organizations which left the Kimberley Process in turn started a new project, the Diamond Development Initiative (DDI) to address the problems of local communities and to foster their development (Le Billon, 2014). Their main goal is to formalize the market, that is to reduce corruption by cutting illicit middlemen and ensuring the full transparency of the diamond supply chain (DDI, personal interview, March 22, 2019). In other words, these projects want to steer the country towards a faster industrialization with increases in foreign investments, improved fiscal returns, and absence of government corruption (Le Billon and Levin, 2009; Levin and Turay, 2008).

If, on the one hand, the Kimberley Process Certification Standard is committed to define what a 'conflict -' or 'blood diamond' is, the Development Diamond Initiative created a new model of symbolization by introducing the 'development diamond' (Partnership Africa Canada and Global Witness, 2004). What distinguishes a 'blood -' from a 'development diamond'? Certainly not the shape or the material. It is always the same extremely hard (and valuable) stone, associated with different meanings. If the first definition points to the intrinsic danger of diamonds, sold abroad for financing armed conflict, the second one recognizes in them the recipe for the growth

of the country's economy.

We can better understand the process through which development projects determine the meaning of diamonds by applying the observation made by Žižek in regard to the nature and definition of 'democracy' (Žižek, 2008, 1997b). Žižek argues that "the essentialist illusion consists in the belief that it is possible to determine a definite cluster of features, of positive properties, however minimal, which defines the permanent essence of 'democracy'" (Žižek, 2008, p. 108). The anti-essentialist perspective rather concludes that it is impossible to detect an underlying essence, a cluster of properties as common denominator. In the same way, the association of 'conflict' or 'development' with diamonds is not immutable, it is not the same in all counterfactual situations, but it rather depends on a contingent definition of 'conflict' and 'development'. The only possible way to define 'conflict diamonds' is to recognize that it contains all the projects and initiatives whose common assumption is that artisanal diamond mining hinders the development of Sierra Leone. In other words, the signifier ('conflict', 'development', etc) associated with the diamond constitutes the kernel of the object's identity.

The predominance of a specific form of symbolization is only the result of a struggle for hegemony over meaning. Once a particular form of symbolization is grounded in the imaginary space, it can be extremely resilient to the tests of reality (Žižek, 2008). It is, therefore, advisable to conduct an analysis of the imaginary space on which the development projects are grounded, an exploration aimed at detecting the presence of self-referential, tautological operations behind the 'pure' signifiers (i.e. 'conflict', 'development', etc) for recognizing to what extent these definitions affect the outcome of the currently predominant type of development projects.

A similar exploration must be made for the concept of 'transparency', a common thread running through the projects' narratives. Indeed, commentators seem to agree that transparency is a discriminating factor for determining whether a diamond is ethical or not and it, therefore, represents a priority for most of the development projects addressing artisanal diamond mining (Africa progress panel, 2013). When it is not possible to trace the movement of a diamond along the supply chain, when no receipts are issued at the point of dealership or export, there are no doubts: the diamond is in the wrong hands. On the other hand, if it is possible to "show that this diamond has been sold through the legitimate chain, then the issues of conflict are all gone" (DDI, personal interview, March 22, 2019). It is therefore no surprise that the Development Diamond Initiative

considers the relationship between miners and *banabana* as the most vulnerable part of the diamond supply chain. Since the *banabana* don't have a licence, "the diamonds they trade become untraceable, regardless of the legality or illegality of their extraction" (Engwicht, 2017, p. 206). On top of that, these brokers would allegedly facilitate the smuggling of diamonds through the borders and exploit the miners, since they do not buy the diamonds for a fair price. The national law, legitimizing only the licenced dealers and precluding the market access to the *banabana*, has proven inadequate to change the structure of the supply chain and, according to the DDI, the number of brokers is currently increasing (DDI, personal interview, March 22, 2019).

The stake of these initiatives is to construct a model of market and society which does not exist yet; this vision of a harmonious society is what Žižek would define as a 'fantasy', that is "a scenario filling out the empty space of a fundamental impossibility, a screen masking a void" (Žižek, 2008, p. 141). This picture does not take into account that "society is always traversed by an antagonistic split which cannot be integrated into the symbolic order" (loc.cit., p. 142) and that a fully formalized diamond market may not only be structurally impossible but also undesirable. After all, the same name *banabana* does not only mean "people who look for big things" but also "people who look for survival" (Pijpers, 2017, p. 143). Once excluded from the diamond supply chain, they would likely lose their only means of survival: is this loss accounted for in the formalization projects' equation?

Driven by the vision of a transparent market for diamonds, some NGOs risk to lose sight of their main goal of fostering the development of the Sierra Leonean society as a whole and not just the one of the diamond market. On top of that, they are overlooking the fact that the middlemen are neither the main cause of the inefficiencies of the market nor the only actors involved in the illicit trade of diamonds (Engwicht, 2018b). As underlined by Engwicht, illegal activities in the sector are not the prerogative of the *banabana* but they are rather common at every level of the supply chain. Sierra Leonean diamonds are illegally mined, traded, and smuggled by multiple actors and the "legal and the illegal diamond markets are closely interwoven, making it in many cases impossible to determine the source of a diamond" (Engwicht, 2017, p. 205). These illegal practices are widespread since they are socially legitimate; as a matter of fact, the same state agents whose task it is to monitor the mining activities usually turn a blind eye and pursue a laissez-faire approach (ibid.).

As a matter of fact, the unlicensed middlemen, regarded by the formalization projects as responsible for the exploitation of miners, enjoy a different reputation on the local level. Both market and state actors associate illegal diamond brokerage with unemployment rather than criminality. The *banabana* are in fact often miners who are temporarily out of work and sustain themselves through the modest income earned through these illicit activities (ibid.). Only a few brokers are able to make considerable profits by trading high-value diamonds, while the majority of them "spend their day sitting at the Open Yai waiting for customers because 'it's better than sitting idly at home'" (loc.cit., p. 209). The success of the formalization projects would therefore compromise the ability of the Sierra Leoneans living in the economically deprived mining regions to engage in an activity that provides them with the means of subsistence (Engwicht, 2018b). These brokers cannot afford to buy a dealer's license, even though they would like to, since the profits are much higher in the formal market (Brokers, personal interview, March 21, 2019). A full-fledged formalized market would, therefore, not integrate these actors. The effect of the formalization projects would be the exclusion of these illegitimate actors from the diamond supply chain, without the necessary measures for providing them with alternative sources of livelihood. The former *banabana* would most likely return to their past occupation as miners and the new labour abundance in the mining fields would presumably result in a decline of the already meagre miners' wages.

The social benefits resulting from these formalization projects may, thus, appear questionable. However, as already stressed above, we do not want to conduct a critical evaluation of these projects but rather shed light on the motivations pushing the NGOs to use their resources for the implementation of traceability systems whose final outcome is the exclusion of the *banabana* from the diamond sector.

If he was confronted with this kind of formalization projects, Žižek would probably argue that the NGOs clearly perceive the *banabana* as foreign bodies corrupting the regular functioning of the diamond market - in their figure, the impossibility of a fully rational form of exchange acquires positive existence. The *banabana* is the means, for the transparency initiatives, of taking its own impossibility into account. The positive existence of these middlemen represents the immanent limit, the embodiment of the ultimate impossibility of the traceability projects. However, the diamond market is not prevented from becoming transparent because of the *banabana*; these actors are only one single component of a social system which largely legitimizes illicit mining and trading (Engwicht, 2018b).

The concept of transparency is what enables different actors to save the appearance of a coherent and regulated market. It serves to cover the inherent impossibility of a harmonious market of equal participants. However, now that we have shown that the ideal of transparency emerges from the imaginary framework, we further argue that a full-blown transparency initiative would have a paradoxical effect in the diamond sector.

Analysing the difference in value between natural gemstones and synthetic ones, we saw that the possibility to see exactly where the synthetic diamond comes from and how it was created kills the event aspect of the gift. There is no doubt that synthetic diamonds are 'ethically cleaner' than natural gemstones but, despite what one would expect, their certified origin does not benefit their price - on the contrary, it decreases their market value. Since it is the gift aspect of the diamond that makes it truly valuable, the transparency of the origin could hurt the price of the natural diamonds - just as it affects the one of the synthetic gemstones - if it were extended to the final consumer. Although it may sound paradoxical, traceability systems could thus have a negative effect on natural diamonds' price, since they affect the perception of the consumers and their fantasies. Just think about your ordinary Christmas present. Do you really want to know where each component of your iPhone came from and how much each actor earned on the way? It would remove even the last aspects of a Derridean gift from the present and leave you with nothing but a pure act of economy.

This also points to the issue that the 'transparency as traceability' paradigm is largely driven by a consumer perspective. This form of transparency stems from a framework that was devised by the big diamond producers in order to save the reputation of the good they were selling (Haufler, 2009; Le Billon, 2014). It is, thus, at its core a paradigm that makes local actors visible for the consumers and is not a framework that gives transparency to the actors themselves.

But the consumers' fantasy of the value of natural diamonds would not be the only one influenced by a system introducing real transparency - that is, a form of transparency that is not only top-down but also bottom-up, a system in which not only the actors within the supply chain are made transparent but the actors are given transparency, too. If such a system was implemented, the general assumption would be that the actors at the bottom of the value chain get empowered, since they have as much detailed information about the diamond market as the final consumers. However, it is equally possible that the miners, once they get access to the data showing the ex-

tremely small rate of findings in the artisanal diamond mines, would feel more alienated than empowered. This knowledge probably offers the miners the opportunity to open new paths and get free from the patronage system; in addition, they are now aware that the 'rate of return' of the work in the pits is negligible and that most of their efforts are in vain. The result would be the dissolution of the whole artisanal mining sector, emptied from within by the achievement of the projects to unveil the underlying fantasy. A facade is essential for the smooth functioning of the diamond market and "if somebody were *publicly* to pronounce the obvious truth that 'the emperor is naked' (...) in a sense the whole system would fall apart" (Žižek, 2008, p. 225).

The prospect of the artisanal diamond sector's dissolution raises a question of great importance for the development projects: would this outcome be desirable? Many analysts suggest that the artisanal mining sector could be gradually replaced by the industrial one. In their perspective, this would be a positive shift since it has the potential to accelerate the social and economic development of the country, creating the conditions for peace and prosperity (D'Angelo, 2013). The intricate social structure surrounding the diamond pits would be substituted by the managerial accounting of industrial companies, ensuring the transparency of the diamond sector. If it is true that, on the one hand, artisanal diamond mining currently represents a source of livelihood for hundreds of thousands of Sierra Leoneans living the mining regions, on the other hand the mining companies would take care of the local communities as part of their Corporate Social Responsibility programs (Octea, personal interview, March 22, 2019).

However, there is ample evidence to suggest that the beneficial social impact of the industrial mining sector should not be overestimated. Firstly, several mineral companies have recently been at the centre of tensions and conflicts with the local communities. In 2007, a protest of a local village against Koidu Holdings, the largest diamond extractive company in Sierra Leone, ended with the death of two protesters (Reuters, 2012). On top of this, the industrial mining sector is not necessarily more transparent than the artisanal one. Some leaked documents emerged during the journalistic investigations called 'Panama Papers' revealed that the same Koidu Holding was owned through a chain of offshore companies and it was evading in this way the property taxes (Fitzgibbon, 2019). The same corporations would allegedly be involved in large-scale illegal activities, since they are "able to smuggle large quantities of diamonds, hide their proceeds, and bribe enforcement agents with ease" (Engwicht, 2017, p. 22).

If the artisanal mining sector is destined to disappear and leave room to the corporations, the greatest governance challenge will be to ensure that the wealth generated by the industrial mining sector is invested in a way that maximizes the benefits for the whole country and not only for a small elite (Fanthorpe and Gabelle, 2013). This appears all the more challenging since it is unlikely that industrial mining operations will employ unskilled workers from the local communities in great numbers (ibid.).

Technology and Fantasy

"As technology affects everyone's lives today directly or indirectly, each one of us should be part of the discussion on how technological tools are developed and applied in society. This applies particularly to actors working to strengthen civil society and human rights around the world" (Nøddekær and Hvid, 2019)

In the previous section, we analysed how transparency became a discriminating factor for whether a diamond is ethical or not. The ability to trace a diamond along the chain was determined as a major component to reduce corruption, empower miners, and reduce smuggling. However, we criticized this model as driven by an imaginary model of harmonious market and society, in which diamonds are a major tool of development once all participants are informed and educated actors. Furthermore, we criticized that this model of transparency is consumer driven rather than locally beneficial. Yet, this model of transparency as traceability becomes even more popular with an accelerated technological development. More and more technical interventions target the diamond value chain and seem to promise an implementation of a traceability system into practice.

A good case in point is the GemFair project, developed in partnership with the NGO Development Diamond Initiative (DDI). When we met the DDI managers in Koidu, they described the programme as a solution for providing the chain's actors with the right incentives to formalize and ensure the transparency of the market (DDI, personal interview, March 22, 2019). The creation of a "secure and transparent route to market for ethically-sourced artisanal and small-scale mined (ASM) diamonds" (GemFair, 2019) would supposedly reduce corruption and exploitation (Partnership Africa Canada and Global Witness, 2004).

The diamonds sold through the programme are audited by the Development Diamond Initiative and, once the miners are certified as ethical producers, they can do business with ethical

buyers, who guarantee higher prices to compensate the miners for the work done to formalize the market. The proposed solution for the transparency of the diamond supply chain is based on the combination of a "dedicated software (an app) and hardware (diamonds toolkit) that seeks to enable the digital tracking of ASM diamonds throughout the supply chain" (GemFair, 2019). In practical terms, the diamonds are recorded through the GemFair app and logged within the GPS coordinates associated with the specific mining licence; subsequently, the diamonds are put in a bag with a unique stamp that cannot be altered and are delivered to the GemFair office for sale (DDI, personal interview, March 22, 2019). This means that every diamond is paired with a GemFair code and, therefore, has an 'identity' in the system. It is thus possible to trace its movements along the supply chain and ensure that it has been channelled into the legal market. According to one of the DDI managers, "the system is amazing because it ensures that nothing is missing and that the diamonds fit in the legitimate channel" (DDI, personal interview, March 22, 2019). If the technology proves successful in this project, it "will be integrated into the industry blockchain platform De Beers is currently developing, providing an added layer of assurance for ASM production" (GemFair, 2019).

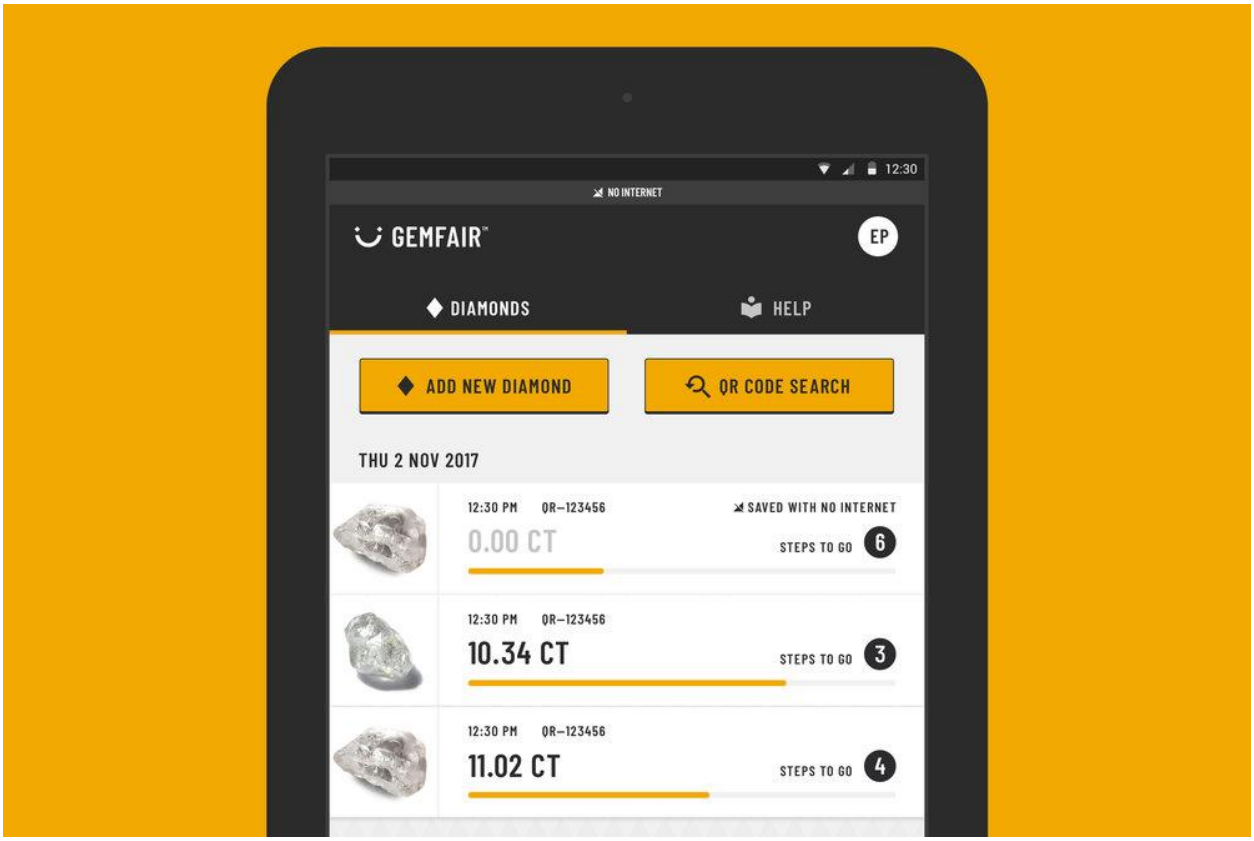

Figure 13 - The GemFair app's user interface ("GemFair," 2018).

One of the main imperatives of this project is to change the miners' mindset since, according to one DDI manager, they "have been programmed to do the wrong things" (DDI, personal interview, March 22, 2019). Confronted with the opportunity to sell the diamond ethically, the miner should consider: "what could I get if I deviate from my traditional way of doing things and I ensure the transparency [of the diamond supply chain]?" (DDI, personal interview, March 22, 2019). In that case, the miner is taking a step away from the exploitation of the diamond mining sector and is instead investing in the development of his own community. What was previously a 'blood diamond', linked to poverty and conflicts, now becomes a 'development diamond', a crucial element for the growth of the Sierra Leone's economy and well-being (Partnership Africa Canada and Global Witness, 2004).

The goal of the GemFair project is to offer a new alternative solution based on the transparency provided by technology in order to cut the middlemen, the *banabana*, from the supply chain. The focus of the project is on "supporting the government and other development stakeholders in bringing traceability to the supply chain and formalising the ASM [artisanal and small-scale mining] sector using an innovative digital solution" (GemFair, 2019). In this way, it will become possible to follow every single movement of the diamond, from the mining pit to the point of export (Freudenberger et al., 2013). The future scenario is a formalized diamond supply chain, in which every miner can get a fair price for his diamonds and smuggling becomes increasingly difficult (Levin and Turay, 2008). Instead of being exploited by the patronage system, the miners can behave like rational market actors, since they have access to all the relevant information for the exchange. The transparency inherent to the system disarms the imbalances of power that characterizes the relationships between the different actors.

In the new transparent system, the informal relationships are excluded since the tracking mechanism makes it nearly impossible for the unlicensed actors to take part in the diamond supply chain. The Development Diamond Initiative is particularly interested in cutting the *banabana* from the supply chain since, in their words, they "promote smuggling, they promote poverty" (DDI, personal interview, March 22, 2019). In their view, they are a force hindering the smooth functioning of the legitimate channel. But the GemFair system would close the loopholes even further along the chain. In a nutshell, many NGOs working in Sierra Leone are driven by a vision of a society without imbalances of power or knowledge, in which exchanges happen in a rational fashion between actors who have access to resources and information. The technology would provide

the means to undermine the rigid patronage system, replacing the informal diamond markets in the streets of Koidu with a digital platform, connecting the international buyers with the local miners (GemFair, 2019). The middlemen would soon become obsolete since the licenced actors have access to a broader network in the formal market.

As explained to us by the local DDI managers, the project is built on the principle of ethical trade and this means that the traceability system relies on the integrity of the miners (DDI, personal interview, March 22, 2019). Since the Development Diamonds Initiative does not have the resources to control the provenance of every single diamond, the only way to prevent the miners to cheat the system and abuse the GemFair app to register illicitly mined diamonds, is to have confidence in their goodwill for the formalization of the diamond market and small-scale random controls. This implies that, despite the promise of ensuring transparency for certifying the origin of diamonds, technology still cannot be used to avoid illicit behaviour at the bottom of the supply chain (Wust and Gervais, 2018). If an illicit miner finds a diamond and makes a deal with a miner who is part of the GemFair project in order to channel the diamond into the legal market by linking it to the GPS coordinates of the licenced mine, the gemstone would, ironically, become a 'development diamond'.

The GemFair traceability system is ultimately conceived as a tool for increasing the transparency of the diamond value chain, a solution enhancing the capacity of NMA officers to monitor the movement of diamonds and to oversee the compliance with mining laws and regulations (Santiso, 2018). However, given these premises, it appears that the projects aimed at cutting the middlemen from the diamond supply chain through a traceability system based on digital technologies are insufficient for solving the issue of illicit diamond trading.

The GemFair project, like similar traceability projects, has its own vulnerability in the social dynamics regulating the diamond sector. A project targeting the artisanal miners can, thus, be successful and sustainable only if it takes the social and cultural context of Sierra Leone into account. In the specific case of formalization projects, it is necessary to consider that the artisanal miners are not only looking for a fair price for their diamonds when they interact with the actors further in the supply chain. Rather, the miners know that "a diamond sold to the right buyer and at the right price today, can ensure that the miner can turn to the buyer in future times of need, with reference to past and future deals" (Engwicht, 2018a, p. 264). In miners' perspective, each transaction does not only create a profit in the present but also an obligation for the future. The resulting

network of reciprocal dependencies with the other actors thus safeguards them from potential negative future scenarios (Engwicht, 2018). In other words, the miners "operate under the shadow of the future" (Engwicht, 2018, p. 265) in a patronage system of which the *banabana* are an integral part.

Since the licensed actors are driven by strong social norms of reciprocity when they interact with the *banabana*, we argue that the projects whose goal is to empower the miners by providing more transparency in the diamond supply chain are doomed to fail as long as they rely on traceability systems.

The possibility to track the movements of the diamond, by means of either cutting-edge technologies (GemFair project) or paper trails (Kimberley Process), is often presented as the solution to the inefficiencies of the diamond sector. However, a traceability system would likely become irrelevant once implemented in the specific context of Sierra Leone. In fact, the harsh living and working conditions of the miners make them dependent on a social network which includes the illicit brokers, the *banabana*. Most of the diamonds, even the ones mined legally, are, therefore, dealt through illegal channels, and their track record gets irreparably muddled (Engwicht, 2018b). As emerged in our interview with the managers of the DDI, the main shortcoming of the traceability systems is that it is often incompatible with the local mindset: "the challenges we are having now are related to the fact that diamonds are completely traceable with technology and people don't want that" (DDI, personal interview, March 22, 2019).

The loopholes of the traceability systems are, however, not only dependent on the relationships of patronage. Both the GemFair project and the Kimberley Process do not track individual diamonds, but parcels of diamonds. This makes it possible to mix the legal and illegal diamonds and record them under the same mining and trading licence in order to make them legal (Engwicht, 2018b). On top of this, the DDI does not have the resources to control the daily operations of the miners and they only monitor due diligence through occasional "integrity checks" (DDI, personal interview, March 22, 2019). Since the penalty for deception is the simple exclusion from the traceability system, the miners could have an incentive to cheat if the stake is high enough.

The traditional governance structure is ultimately difficult to change overnight, since it reflects the relationships of power bounding the supply chain actors. Given these premises, the NGOs should analyse carefully whether strict enforcement of the formal rule would lead to negative or positive outcomes. When the implementation of the regulation would presumably "worsen

the livelihood security of already marginalised populations" (Engwicht, 2018b, p. 481), traceability systems or other formalization projects do not represent the best solution for the country's development.

At the same time, it is important to distinguish between 'traceability' and 'transparency' - they are similar, but they are not two sides of the same coin. In the next chapter, we suggest that it is possible to improve the transparency of the system even without strict formalization of the diamonds market. The tool for this will be blockchain technology.

Chapter 5 - Blockchain Technology

As we have seen in the previous chapter, technological interventions in the diamond value chain, are driven by the paradigm of transparency as traceability. Blockchain technology is no exception to this. Both within the industry and in the surrounding academic literature, blockchain technology is mainly envisioned as an enhanced back-end solution for traceability systems (Everledger, 2019; Provenance, 2016a, 2016b). An exemplary analysis for the envisioned usage of blockchain technology in the diamond sector reads: "[u]sing these publicly available records on the Blockchain, a potential buyer can clearly determine if the seller is the actual owner of the diamond and can also make sure he is not buying a 'blood diamond'" (Hackius and Petersen, 2017, p. 8). We have already criticized this approach in the previous chapter. As will become apparent in the course of this chapter, blockchain technology shares all the challenges we mentioned in our analysis of the GemFair application. However, we do believe that the unique properties of blockchain technology can be used for a different type of technological intervention that operates outside of the 'transparency as traceability' paradigm.

In this chapter, we will, therefore, outline the basic idea of blockchain technology, how it works, what distinguishes it from older solutions, and why it is currently believed to hold big potential in so many areas. We will start by explaining Bitcoin, the first system that used blockchain technology, and will then move on to Ethereum to explain how it builds on the ideas of Bitcoin and where it differs from it. Specifically, we will explain the idea of 'smart contracts', which Ethereum supports but Bitcoin does not. By the end of the chapter the reader should have a conceptual understanding of what the blockchain is, how it can be applied today, and what advantages and potential pitfalls the technology has. In the next chapter, we will utilize this knowledge to present our own proposal for a blockchain-based intervention in the artisanal diamond sector of Sierra Leone.

Bitcoin and the Beginning of Blockchain Technology

Understanding blockchain technology begins with understanding Satoshi Nakamoto's motives for developing it. The basic need that Nakamoto, the pseudonymous inventor of Bitcoin, wanted to fulfil can be summarized by this statement from the original Bitcoin whitepaper:

> What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party (Nakamoto, 2008, p. 1).

Essentially, Nakamoto argues that whenever we pay with other means than direct cash payment, we cannot be certain that the other party will uphold their commitments. Hence, we need to rely on a third party to verify the other person's credit worthiness.

For example, if you bought a diamond online, interacting directly with the jeweller, there is simply no way for the jeweller to tell whether you have the money you claim to have. He would have to wait until the money reaches his bank account to be sure that you can uphold the payment obligation you committed to. As this is highly impractical, we usually use third parties that give us credibility and assure the jeweller that our commitment to pay is indeed credible. Such a third party could be a credit card company or simply our bank. Nakamoto's aim was to find a way of eliminating these third parties from the calculation, as they cost money, are liable to attacks from hackers, and collect a lot of data about their customers, which they could potentially abuse.

Hence, his first and foremost goal was to design a system that would process transactions between entities without any third-party. This is why the Bitcoin system is known as a *decentralized, peer-to-peer* network. This means that the current state of the network is not saved in one central server but on many different 'nodes' in a network, where a node is just the name for a participant in this network. As such, blockchain technology is essentially a data management mechanism replacing traditional server technology, which enables entities to transfer value or information between each other without any third-party.

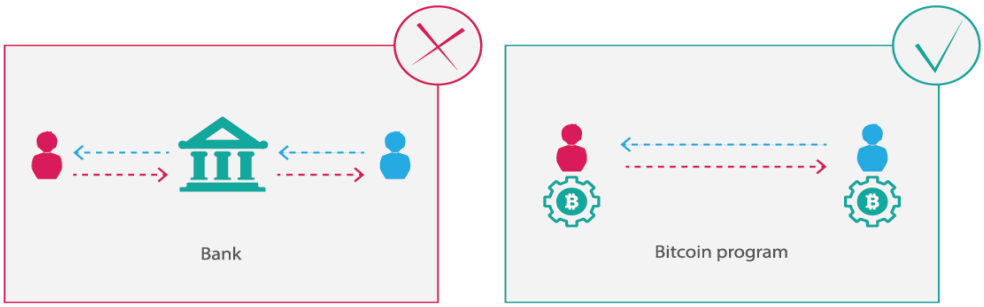

Figure 14 - Traditional exchange vs. exchange on bitcoin (medium.com, 2019).

If you set out to design such a system, you will quickly encounter a major obstacle: how do you avoid double-spending? Digital goods are by definition goods that can be infinitely copied. In a decentralized, digital system, how can anybody prove that they did not give the same coin to two different people?

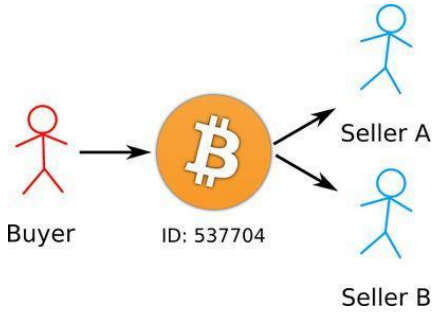

Figure 15 - The double-spending problem (bitcoinwiki.org, 2018).

As illustrated in figure 15, seller A and seller B cannot be certain that the specific coin the buyer uses to pay was not already spent, since digital items can be copied infinitely and there is no central authority that keeps records of coin transactions. Again, referring to our jeweller example, even if you could prove that you own a coin, you could copy that coin and use the same coin to buy diamonds twice. Jeweller B could check whether you own the coin but could only know that you already spent the coin by calling jeweller A and asking them, whether the specific coin (Coin 537704) has already been spent with her. In reality, of course, there would be an infinite number of other jewellers, or shops in general, where you could have spent that coin, so how can anyone hope to determine, whether a coin was already spent or not?

What is needed is a way to reach *consensus* on the state of the system that any participant can easily check. In a traditional setting, a third party like your bank would know whether you

already spent this specific coin or not. Hence, you would reach consensus by asking your respective banks. But in a decentralized system, where no central authority keeps record of the transactions, somebody could claim to have a coin when in fact they already spent the same coin elsewhere. Bitcoin is the first decentralized system that has a convincing solution to the double-spending problem: the so-called 'blockchain'.

The Blockchain

Before we go deeper into the way that Bitcoin solves the double-spending problem, it is important to understand what the Bitcoin network actually is. Anybody who wants to participate in the Bitcoin network needs a private-public key pair, which is like an account and constitutes one node in the overall Bitcoin network (Dannen, 2017). This node will be managed by your wallet, a programme which runs the Bitcoin protocol in order to participate in the network. This wallet provides the 'front-end' to access this network, where front-end describes all the things you interact with, such as buttons, fields, text interfaces, cursors, etc. All these graphical elements are not a direct part of the blockchain protocol, they just help you to access it. The underlying blockchain is providing the 'back-end', i.e. the way that data is managed. Hence, your wallet can look very different from somebody else's wallet when it comes to the user interface, but you will still access the same Bitcoin network (ibid.).

The network forms because each node is mandated to connect to at least 8 other nodes in the system - though most are connected to far more nodes (ibid.). This way, via many indirect links, each node will be connected to each other node in the system. A node can send and receive two different kinds of information: Transactions and blocks (Decker and Wattenhofer, 2013). In both cases, the information has some origin node that will send the information to the nodes that are connected to it, which will pass it on to the nodes that are connected to them in turn. For example, if you make a transaction to the jeweller, your node will be the origin node and send the information to the nodes that are connected to you, which will send it on, until eventually the entire network knows that you made a transaction to the jeweller (ibid.).

Collectively, all the transactions that happen in the network form a 'ledger' that is stored on each node (ibid.). As the ledger is the sum of all transactions, it effectively contains the account balance of the entire network and of every participant in it. It is like the database of the network. Hence, by referring to the ledger each node can determine whether a transaction that it receives is

valid or not. Consequently, each node must constantly have the most recent copy of this ledger, i.e. it must download the entire history of the blockchain before it can participate in it, and whenever it is offline for a while, it will have to download all the transactions it missed. This happens by connecting to another node on the system, so that all nodes constantly update each other on the newest form of the ledger.

The problem with this is the aforementioned consensus within the network. Sending a transaction through the entire network causes a certain delay, the so-called 'propagation time' (ibid). This means that over time the ledger that each node has saved as its own local ledger, will become inconsistent with ledgers that other nodes keep as their local ledger. This can happen because a node receives a transaction that transfers coins from one person to the next but has not yet received the transaction that made these coins available for that person in the first place. Hence, a node will reject such a transaction because it does not match its local ledger, even though it is in fact a valid transaction. At the same time, two or more transactions could be made with the same coin, which is the 'double-spending attack' mentioned earlier. Again, a node could send a transaction including a coin to one part of the network, and then send a transaction with the same coin to a different part of the network, which would mean that they would be counted as valid in both parts of the network, as long as the second transaction reaches part of the network, before the first transaction does. The network would then disagree on the ledger and get out of sync, which essentially means that it would cease to function, and transactions could no longer be processed.

To maintain consensus in the network, two additional things are needed. Firstly, transactions get time-stamped. This way transactions can be put into chronological order. Secondly, a second data structure is needed, so called 'blocks'. Special nodes in the network, which are referred to as 'miners', bundle the transactions that are sent to them into blocks, in accordance with the rules of the Bitcoin protocol. A block can be interpreted as a container for a given number of transactions. Once they have enough transactions to fill a block, miners propose this block to the network.

Each proposed block contains four elements: A time-stamp to prove when it was created, a list of transactions, a nonce, which we will return to shortly, and a hash of the previous block. We will begin with the hash. A hash is a mathematical operation that is like a one-way encryption. You can insert any input, number or character of any length into a hash algorithm and will receive a single 64-digit number. This single number will always be the same when you insert the same

input into the algorithm, but if you even change one letter or digit of the input, the output will be radically different. This means that hashes can be used to easily compare large quantities of data. If you are not sure whether you and a counterpart have the same data, you simply insert all the data you have in a hashing algorithm and if you and your counterpart end up with the same hash, this means you have the same data. As the hash of the previous block that was successfully validated is always included in the next block that is generated, all blocks are linked in a chain. A *block-chain* in fact.

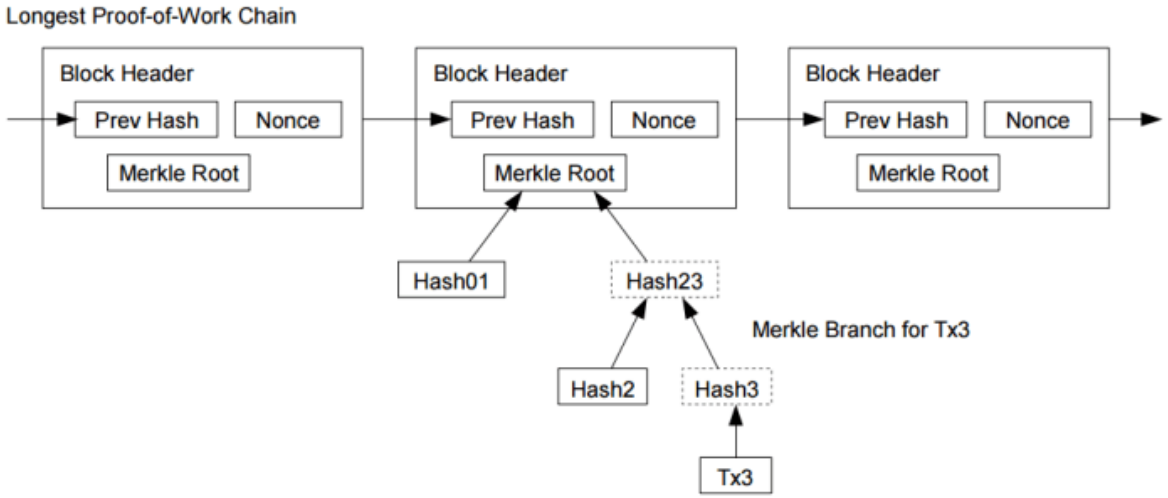

Figure 16 - Simplified illustration of the blockchain (Nakamoto, 2008).

You can see in figure 16, how the previous hash is included in the block body, linking every block in the chain to its predecessor. The hash of a block is generated by simply putting everything in the block - previous block hash, nonce, transactions and time-stamp - through the hashing algorithm. The resulting hash is synonymous with the block from then on.

This has the effect that all nodes in the network can easily and quickly check if they are in sync with each other. Transactions are bundled in blocks and blocks are hashed, which means that we can see that we have the same history of transactions by simply comparing the hash of the latest block. If this hash is identical, we know that we are working on the same chain. If you wanted to attack the chain now, e.g. by reversing the transaction to the jeweller after you received the diamond, you would have to change the content of the previous block, in which the transaction was included. But if you tried to change a past transaction and thus a past block, everyone would know it because each proposed block needs to reference the hash of the previous block in it, which would

have to reference the hash of its previous block in turn, and so forth. This works all the way down to the original 'genesis' block. So, even if you would change a transaction that happened all the way back in block 1, the entire chain would break, as the hash in block 2 that points to block 1 would no longer work, which would mean that the hash pointing from block 3 to block 2 would no longer work, etc. Hence, if you wanted to change a transaction in a past block you would need to build up the entire chain from anew. This is why the blockchain is referred to as *immutable.* Once an input is on the blockchain, it cannot be altered anymore, unless you change the entire chain, which is virtually impossible, as we will see shortly.

The system described above only works, if we all agree that we can trust the recent block and that it contains the correct state of the network. This is where the other two components of the block come into play. First, the time-stamp (not included in figure 16). Simplified you can say that no block that is older than the current block can be added after this current block[9]. If block 2 was time-stamped at 8 pm on May the 13th of 2018, then block 3 cannot be time-stamped at 7 pm on the same day. This way we can be assured that a block propagating in the network is indeed reflecting the most recent state of the network.

Lastly, the nonce - a sort of computational puzzle - comes into play. So far, we have not made any restrictions on who can propagate a block in the network, nor have we clarified what happens, when there are several conflicting chains. For instance, one version of block 1 may propagate in the network while a different node has already propagated block 1* and 2*. Which version of the chain should a third node accept as true in such a case? The answer is straightforward: The Bitcoin protocol dictates that the longest chain is to be considered legitimate.

For this the *proof-of-work* is essential, which in turn relies on the nonce. As should be clear by now, a block cannot simply be accepted by the nodes in the network. They need to have some validation assuring them that the given data block is valid. This validation is equal to what we already introduced as 'mining'. Any node that wishes to participate in the validation process can do so and become a miner themselves. All miners in the network compete in constructing blocks for the network, because whoever proposes a successful block will get a reward in bitcoins. This is how new bitcoins enter the system.

Miners construct blocks by bundling a number of transactions. It is up to the miners to

[9] In reality there is a certain tolerance due to propagation time and unsynchronized system watches, but the principle still holds (Decker and Wattenhofer, 2013).

decide which specific transactions they want to include in their blocks. They will go through each transaction that they want to include in their block, checking it for the right format. In case the format is right, the transaction will be enacted and written as conducted into the block. After the block is filled with transactions, the miners will add the hash of the previous block to the new block and time-stamp it. Finally, the miner will conduct the proof-of-work (Buterin, 2014a).

The proof-of-work requires a solution for a computational puzzle of a sort, namely, to find the nonce. Due to the way they are constructed, solving these puzzles is enormously difficult but checking whether they were solved correctly is easy. The specifics of the proof-of-work are irrelevant for our purposes, but it takes millions and millions of guesses to find this nonce, depending on how difficult the system makes it[10]. Since building a block takes time and effort but checking whether the block was built correctly is easy, the propagation of a false block through the network is costly and slow. Every miner is competing to perform the proof-of-work first, as only the fastest of them will get a reward for doing so, which means that the miner with the greatest computational power has the greatest chance of receiving this reward. Once a node finds the correct nonce, it will send the block to the network.

The participants in the network will download it and will check whether the proof-of-work is valid. If it is, they will send the block to the next nodes that are connected to them until eventually the entire network will have received the new and valid block. Any transaction that is included in a block that is validated in this way, is then taken as consensus, which is to say as the 'truth' of the network. It contains the information of the entire network in it and will be used as a reference in the next block (Buterin, 2014b; Dannen, 2017).

The proof-of-work makes attacks on the network costly and slow. Attackers that want to double spend intentionally create alternative versions of already existing blocks. However, the proof-of-work means that they cannot generate blocks at will but need to validate them by guessing lots of difficult puzzles. Yet, even if they succeeded in constructing a false block, they would need to build the longest chain to make the network accept his version as truth. Thus, constructing one false block is not enough. All the while the network is working on the honest chain, increasing the number of blocks that the attacker would have to forge even further. Hence, the reason why the

[10] The Bitcoin algorithm aims at validating new blocks every ten minutes, hence, if the algorithm detects that previously nodes have guessed the hash more quickly, it will increase difficulty, so that the next blocks will be harder to validate. In Bitcoin, this process is a delayed mechanism that adjusts difficulty every 2 weeks (Swanson, 2015, p. 51).

blockchain protocol dictates that the longest chain should be taken as true, is because the longest chain has the most proof-of-work to back it up.

As long as the honest chain controls at least 51% of the network's computational power, an attacker will never catch up with it and his attempt to alter the chain will never be validated. As the Bitcoin network consists of thousands of nodes, the current state in the world is that not even the best super computers could muster enough energy to sustain such a 51% dominance in the network[11]. Therefore, the honest chain will always remain the longest chain and thus the one that is accepted by the network.

This system is what gives blocks their validity and makes them accepted as truth. All participants in the network know that in order to propagate a block through the network considerable computational power is needed. At the same time, each node can easily check the truth of a block. Remember, solving the proof-of-work is difficult but seeing whether a proposed solution is true is easy.

Furthermore, the blockchain is perfectly *transparent*. Since the blockchain is decentralized and public, any block that has ever entered on a public blockchain can be seen by anyone. As mentioned before, to participate in the network nodes have to download the entire block history from peers, meaning every node has the possibility to check any transaction that has ever happened. It is in fact possible to look at any Bitcoin block that has ever entered the system, from its first block generated on the 1st of March of 2009 at 18:15:05 until this day.

Summarizing the chapter, we can say that Bitcoin is the original blueprint for a blockchain system. The blockchain is the back-end system that enables its management of transactions in a *decentralized*, *peer-to-peer network*, in a *transparent*, and, therefore, *perfectly auditable* way that is (practically) *immutable*. Bitcoin is an example of a *cryptocurrency* in which blockchain technology is used as a way to guarantee trustless payment without having to refer back to third parties like banks or credit card companies. However, the idea of storing and exchanging data without trust, and without having to refer to an intermediary, makes blockchain interesting for many other use-cases as well. In the next chapter, we will, therefore, look at Ethereum, which was specifically built with these other use-cases in mind.

[11] Although mining power is enormously concentrated in the Bitcoin network. At the time of this writing, more than three quarters of mining power are concentrated in only 6 mining pools (blockchain.com, 2017).

Ethereum and Smart Contracts

In the previous section, we have seen how the Bitcoin network enables the transaction of value from one person to the next in a secure way and without an intermediary. However, you may still wonder how you could utilize such a system to trace diamonds or save documents. Indeed, with the Bitcoin protocol this is impossible. In effect, Bitcoin consists of two parts, its currency aspect and the blockchain technology that enables this currency to function. The latter was originally tailored for the need of a cryptocurrency, yet the developer of Ethereum, Vitalik Buterin, realized that its underlying function - a mechanism that can establish consensus in a decentralized fashion - could be applied to a variety of other use-cases. As he observed: "[beside the currency], there is also another, equally important, part to Satoshi's grand experiment: the concept of a proof-of-work-based blockchain to allow for public agreement on the order of transactions" (Buterin, 2014b, p. 1).

For example, imagine you wanted to construct a contract that says that you will buy a diamond but only if it has a valid Kimberley certificate[12] - if it does not, it should not even be possible to conduct the exchange. On top of that, you want a completely decentralized, peer-to-peer exchange, without having to rely on a third-party but also without the possibility to even conduct the exchange without the conditions being met. The Bitcoin protocol doesn't allow you to do that. But Ethereum does.

With Ethereum, Buterin wanted to detach the currency aspect from Bitcoin and develop a general-purpose blockchain that harnesses all the advantages of the Bitcoin protocol, specifically the decentralized way in which it reaches consensus, but that also adds features that would make it applicable for use-cases like the one described above. To quote once again from the Ethereum whitepaper:

> What Ethereum intends to provide is a blockchain with a built-in fully fledged Turing-complete programming language that can be used to create 'contracts' that can be used to encode arbitrary state transition functions, allowing users to create any of the systems described above, as well as many others that we have not yet imagined, simply by writing up the logic in a few lines of code (Buterin, 2014b, p. 1).

Ethereum, therefore, keeps many features from the Bitcoin chain. Transactions are still bundled into blocks by miners and then validated with a proof-of-work, and time-stamped, before they are

[12] For simplicity's sake we will assume that there is a digital version of a Kimberley certificate that can easily be connected to a real-world diamond.

propagated through the network. Also, each node still keeps a record of the ledger just like in Bitcoin, ensuring perfect auditability.

However, *state* in the Bitcoin network is "the collection of all coins [...] that have been minted and not yet spent, with each [coin] having a denomination and an owner" (Buterin, 2014b, p. 5). Nodes in and of themselves do not have a state. There is no part of a node on Bitcoin that actually saves account balances or similar. Any such functionality that one may see on wallets is encoded in the wallets themselves and not in the Bitcoin protocol (Dannen, 2017). The problem with this, if you think of the contract example given above, is that a state like 'has a valid Kimberley certificate attached to it' cannot be done in Bitcoin. However, in Ethereum "the state can include such information as account balances, reputations, trust arrangements, data pertaining to information of the physical world; in short, anything that can currently be represented by a computer is admissible" (Wood, 2014, p. 2).

We will not go into the details of how this is achieved here[13]. The important part is that this state function allows Ethereum to create complex contracts that have autonomy on the chain because they can save different internal states, unlike on Bitcoin where contracts could only have states like "exists" or "does not exist" (Dannen, 2017, p. 123).

The next, arguably even more important, addition that Ethereum makes is a Turing-complete programming language. Turing-completeness means that a programming language can emulate the functions of any other programming language. In other words, there is no computational function that a Turing-complete language cannot execute. This allows for the creation of contracts that are not only saving state but can also work autonomously according to a logic of code. These 'smart contracts' can be executed on the Ethereum blockchain. The idea is quite simple: a smart contract is a contract that automatically executes itself, if, and only if, a certain condition is met. Traditional contracts require somebody to enforce them, but smart contracts do not. Coming back to our example, when you draft a traditional contract between yourself and the diamond exporter, it could specify that you need a Kimberley Certificate, but you could simply ignore the clause, or you could even make a "gentleman's agreement" with the other party to show it later, when the purchase is already done. In a smart contract, this is impossible because the transaction logic is embedded in code. If the seller wants the payment from the smart contract, he *must* send the Kimberley Certificate.

[13] More information can be found in the Ethereum Yellow Paper under Appendix D (Wood, 2014).

Ethereum was specifically developed with this functionality in mind. Contracts in Ethereum are separate entities on the blockchain. They are independent nodes and, once they are created, they are autonomous, meaning their creators have no more control over them than any other node in the network and can only interact with them within the logic of the code. Contracts can be targeted for transactions from both human users as well as other contracts. Depending on their internal code, receiving certain transactions will trigger their function. For instance, the diamond contract from earlier would have a contract logic like "If [diamond] has [Kimberley Certificate] attached to it, execute [transaction]". To make this contract work, you would first have to store money in the contract, which it could use for payments. If the diamond in question does not have a Kimberley certificate attached to it, the money is locked in the contract and not even the contract creator could get to it. At the same time, it also gives additional security to the buyer, since you cannot default on your payment. The money is stored in the contract on the chain and cannot be withdrawn from it unless the internal conditions are met.

Contracts are created with transactions from 'external nodes', which are much like the nodes we know from Bitcoin. They are controlled by private keys - which is to say mostly by human users - and they connect in the same way to other nodes on the chain, in order to disseminate data and synchronize their local ledgers. Therefore, they can make transactions and mine and validate blocks in the same way as in Bitcoin. The most important difference is that they also save a state on Ethereum and can create 'contract nodes', which is the on-chain representation of smart contracts in Ethereum. For this, an external node starts a transaction for which it targets an address that does not yet exist on the chain. The protocol then allows them to attach information to this transaction. This information can initialize the code that you want to run on said contract, which is why it is referred to as 'init' (Wood, 2014, p. 9)[14]. In the Ethereum protocol, it is possible to write and deploy such smart contracts with just a text editor and a wallet programme (Dannen, 2017, p. 110). As a smart contract is a node in the network, it will connect to other nodes in the network in the same way as external nodes and will receive and send transactions in the same way. The code for contracts is stored in each block, and thus, passively downloaded onto any machine that is mining (loc.cit., p. 106). This, in turn, means that once a smart contract has been uploaded to the Ethereum chain, anybody connected to the network can access it.

[14] How exactly this happens is irrelevant for our purposes. A technically comprehensive description can be found in the Ethereum Yellowpaper under sections 7 and 9 as well as appendices E and H (Wood, 2014).

To summarize, a smart contract is an entity on the chain that is visible to everyone and can be triggered by an external input in the form of either a transaction or certain information. It will then generate an output, again in the form of a transaction or certain information, as long as its underlying code dictates it to do so.

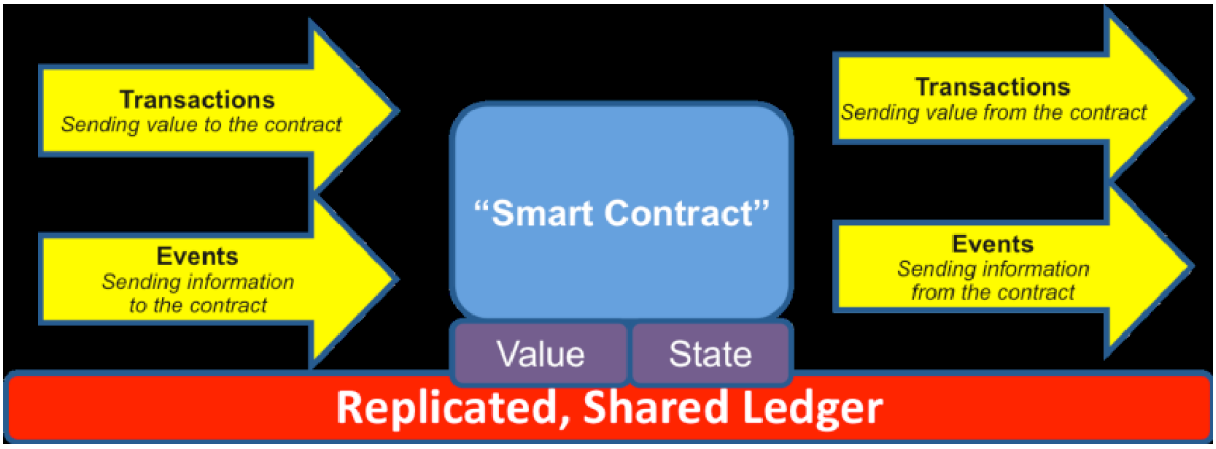

Figure 17 - Sketch of a smart contract (Richard Brown as quoted in Swanson, 2015).

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With Turing-complete smart contract coding and a possibility to save states, the construction of complicated procedures is possible. As mentioned before, Turing-complete programming languages are able to perform all computationally possible tasks, including conditional statements and loops. Consequently, any kind of decentralized app (dapp) can be built on Ethereum. Smart-contracts executed on the blockchain provide the back-end for these applications, replacing traditional databases stored on one server (Dannen, 2017, p. 90).

The potential benefits of such dapps are huge. If such a system could be operationalized, there would no longer be a need for middlemen. Imagine you would have an app like Facebook but without a corporation that collects all your data. Or an iTunes in which all revenues go to the music producer directly, without Apple cutting their share. No longer could the middlemen forward your data to government agencies or sell them to other companies. No longer could corrupt contractors change data after entry on the system. No longer could hackers steal passwords or other personal information. The list of potential benefits goes on.

The design philosophy of Ethereum is, therefore, that of a platform that enables many different applications to be run on top of it, with itself only functioning as a bottom layer on which to build:

> Ethereum [...] is essentially the ultimate abstract foundational layer: a blockchain with a built-in Turing-complete programming language, allowing anyone to write smart contracts and decentralized applications where they can create their own arbitrary rules for ownership, transaction formats and state transition functions (Buterin, 2014b, p. 13).

It aims at giving developers complete freedom in the way their chains operate, without the need to construct a fundamentally new chain each time they want to create a new application. In other words, they get the network security effect from a huge community without the wide-ranging submission to protocol rules, as Bitcoin requires them for example.

With all these potential benefits you might wonder why no 'killer-app' based on Ethereum has emerged yet. There are two main problems that are currently hindering Ethereum's development: transaction speed and scalability.

The number of transactions in the network increases dramatically once complex applications are built on it. The Bitcoin protocol targets 10-minute block times, but Ethereum must move a lot quicker. Imagine you wanted to create a decentralized messenger app and every time you send a message it takes 10 minutes before it reaches the intended recipient.

Due to some technical differences, the Ethereum chain manages to remain as secure as the Bitcoin chain even if its transaction speed is 40 times faster (Buterin, 2014a). Yet, even with this speed-upgrade it is not nearly fast enough to support a wide array of complex applications. A common reference against which Ethereum is measured is the VISA network, which can process up to 47,000 transactions per second under stress-conditions (Koteska et al., 2019, p. 2). Ethereum manages roughly 15 transactions per second (Buterin, 2019).

Ethereum is, therefore, attempting to improve its consensus algorithm, from a 'proof-of-work' to a 'proof-of-stake' mechanism and to introduce 'sharding', as well as some modifications to how blocks are saved in nodes (Buterin, 2016). As none of these concepts is implemented as of now, we will not go in depth with these topics here. It is, however, important to know that Ethereum has an in-build "difficulty bomb" that will make mining in the proof-of-work sense impossible by the year of 2021 (Lim, 2016). A protocol fork in which nodes will update on a new Ethereum protocol will, therefore, occur until then in one form or another. An important side-effect of a switch to a proof-of-stake is that the energy consumption issue, for which Bitcoin has been heavily criticized, would also be solved[15].

[15] Some estimations suggest that Bitcoin consumes more energy than the entire country of Ireland (Buterin, 2016).

To sum this chapter up, Ethereum keeps the features of transparency, (practical) immutability, security of ownership, and transaction that characterise the Bitcoin network. It adds the possibility to write smart contracts. Smart contracts are entities on the chain that are governed by code and will automatically execute their function depending on a certain input. This makes the Ethereum chain interesting for a number of use-cases. Currently, the protocol is suffering from low transaction speed and scalability issues, however. While there is research to solve these issues, there has not been any solution to them yet. Despite this, within these limitations first pilot projects that utilize blockchain technology have been conducted. In the following, we will, therefore, evaluate the suitability of a blockchain based solution to the specific context of the artisanal diamond value chain in Sierra Leone.

A Blockchain-powered Cadastre

We have now seen some of the potential and limitations of blockchain technology, as well as several challenges within the Sierra Leonean diamond value chain. We have elaborated on why we believe that traceability systems are not fruitful as an intervention in this context. As we explained, we believe that these systems operate under an image of society that shows characteristics of a Lacanian fantasy. Furthermore, we criticized that instead of giving more power to the local actors, these systems rather make the local actor subjected to a demand from consumers. Finally, we outlined why these systems are technically infeasible anyway, since they can be tricked, especially in a context that is characterized by reciprocal behaviour and gentlemen's agreements. However, there are other ways how blockchain technology can be used to improve the governance of the artisanal diamond value chain in Sierra Leone.

During our interviews we registered a number of problems associated with the distribution of small scale and artisanal licences. It is worth noting that there has already been progress on this frontier. Until recently, information relating to mining agreements between the government and natural resource extraction companies were kept on paper documents at the NMA. These were often in conflict with each other or outdated (Ministry of Mines, personal interview, March 19, 2019). This is no longer the case. In 2012, the government of Sierra Leone established an online database for mining contracts (Mustapha and Van der Linde, 2012; National Mineral Agency, 2019). The purpose of the system, developed with the support of international partners, is to place

all revenue data for the country's extractive industry – including payments made for licences, royalties and contributions to local chiefdoms – on an online platform, published for public accessibility. This is called the "Cadastral Survey Map" (*The Mines and Minerals Act*, 2009, p. 33), or more commonly 'the NMA digital cadastre'.

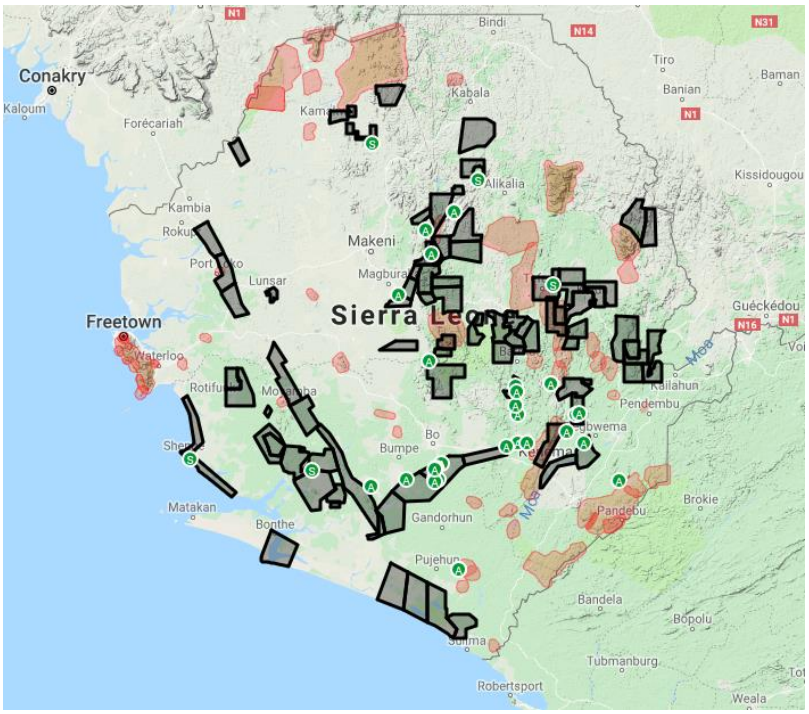

Figure 18 - Interface of the current digital cadastral survey map (National Mineral Agency, n.d.)

As can be seen in figure 18 the cadastre displays all licences, including the area for which these licences apply, the holder of the licence and further information. However, the cadastre comes with a number of problems. First and foremost, until now only industrial licences are displayed on the cadastre. Artisanal licences are not listed (National Mineral Agency, n.d.). Secondly, several of our interview partners complained that the platform was often either slow or not accessible at all (NGOs, personal interview, March 22, 2019). Additionally, it is vulnerable to hacking and can be manipulated at will from those in charge of the system (Le Billon and Levin, 2009). In a hypothetical attack case, one licence holder could bribe the government officials in charge to extend the land covered under his licence, potentially on the expense of another licence holder. This is admittedly more likely to happen for industrial than artisanal mining licences, but trust in the government is low on any level, so devising a way to make the system tamper-proof may be beneficial for public trust in either case.

The latter point leads us to further problems that are not directly associated with the cadastre technology but the licence distribution more generally. Some interviewees complained that licences, which usually need the approval of the NMA, the paramount chief, and the local chief, disregard the local chiefs (LMMG Member, personal interview, March 21, 2019). It is important to note that guidelines on the pre-acquisition stage for mining licences are quite confusing. As an analysis by the NMA points out:

> [D]espite clear licensing guidelines, the role of local community authorities and guidelines for their activities and payment requirements at the pre-licensing stage are unclear and vary from chiefdom to chiefdom. Each local community authority implements different pre-licensing AM [Artisanal Mining] procedures resulting in uncertainty for AM miners and considerable local authority discretion particularly with respect to required payments to be made by artisanal miners to complete pre-license procedures. (National Mineral Agency, 2018, p. 18 f.)

It seems, however, as if the discretion that is mentioned in this analysis is largely the prerogative of district chiefdom authorities. Actors on the level of the affected communities, on the other hand, are, allegedly, passed over. In such a case the NMA or the paramount chiefs issue temporary licences to beneficiaries without the local chief's knowledge and simply leave the respective field for the signature empty (LMMG Member, personal interview, March 21, 2019). Additionally, according to the Ministry of Mines many miners are unaware that they have to renew their licence: "sometimes people think that once they have a licence the plot belongs to them even without renewal [...] I experienced this myself when I was working for an NGO that with having a licence comes this sense of entitlement once you have obtained a licence" (Ministry of Mines, personal interview, March 19, 2019). Finally, the licences sometimes overlap in the area they cover (National Mineral Agency, 2018, p. 20).

We believe that all of these problems can be solved with a blockchain based intervention. Our suggestion is to put all mining licences on a public blockchain, which essentially means to put the mining cadastre as a whole on the blockchain. This solution is based on a model provided by ChromaWay, a Swedish blockchain start-up which is currently developing a pilot project in collaboration with the local government of Andhra Pradesh, India, for the implementation of a blockchain-powered cadastre system (Bhattacharya, 2018; Kairos Future, 2017). Their promise is that such a system would not only eliminate fraud and errors, but also reduce the administrative burden and the costs related to land registration (ChromaWay, 2019).

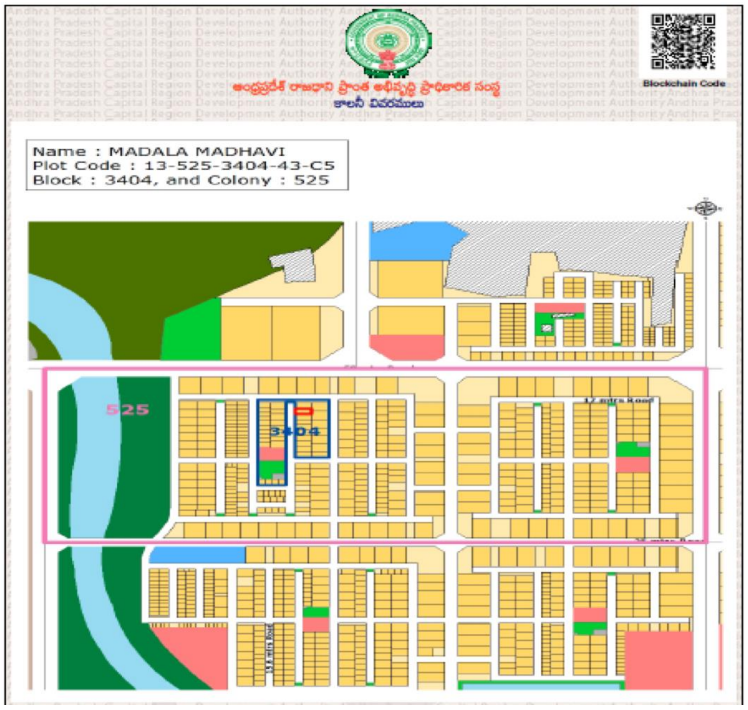

Figure 19 - User Interface of the ChromaWay application (Bhattacharya, 2018)

The ChromaWay project is tied to the construction of a new city in Andhra Pradesh. Landowners and farmers in the surrounding area could sell their land to gain a plot in the new city. The idea of the ChromaWay system is to provide tamper-proof evidence of land ownership, by attaching plot numbers to certain GPS coordinates. By putting these land titles on a blockchain, there can be no dispute over who owns which space once the new city becomes reality. This, in theory, prevents corrupt officials from forging records to benefit themselves or their followers once the new city is established. It also prevents the loss of documents in the meantime. Any plot owner has a bullet-proof evidence that they own a certain plot (ChromaWay, 2019).

We believe that a similar system can be utilized in the case of Sierra Leone. Leveraging the benefits of the Ethereum protocol, we propose the integration of blockchain technology with the already existing national land registry, which records the active mining licences. The idea is to attach the mining licences to certain GPS coordinates and then upload them on the blockchain in the same way as the ChromaWay project is doing it. This solves several problems at once. First, the decentralized structure of blockchain technology means that access is always guaranteed as the servers cannot go down. In the context of Sierra Leone, where frequent blackouts are a reality (Nyally, 2019), this is advantageous. The option of an always online service that does not depend

on a central server eliminates this problem. Furthermore, a full digitalization would solve the issue of overlapping licences. As explained in the previous chapter, the technology behind such a system would also mean that it cannot be hacked or tampered with by potential rogue government officials or malign attackers from the outside.

However, even more problems can be solved with a blockchain system. The system could automatically send miners an information that their licence is expired, or is about to expire, and would automatically revoke itself. Such a mechanism can easily be coded into a digital licence, which would take the form of a smart contract. Furthermore, the issue of bypassing the local communities can be solved, too. The issuance of licences can be tied to a smart contract that requires all three parties - NMA, paramount chief, and local chief, as representative of the local community - to agree on issuing it. With smart contracts, this requirement can be put into code making it impossible to issue a licence without the consent of all three parties. Simply leaving a field empty or forging a signature does not work on the blockchain (Wust and Gervais, 2018).

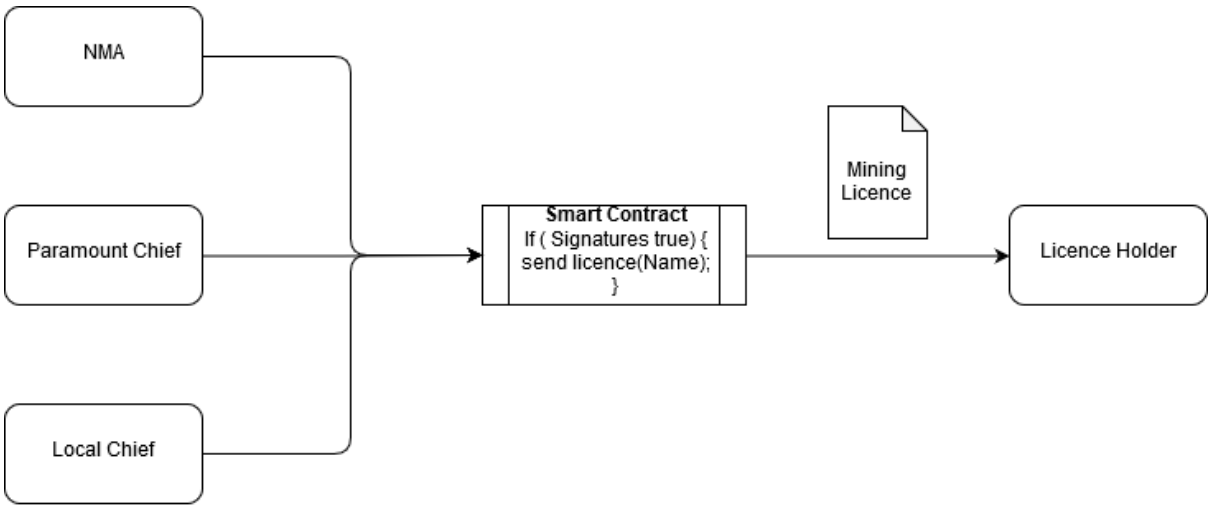

Figure 20 - Scheme of a pseudo Smart Contract for licence application (own picture).

Such a system could give miners instant clarity about the validity of their licence. It could establish a single, always online source of truth that is unhackable, tamper-proof, and accessible to anyone (Coppi and Fast, 2019). This could prove to be a powerful tool for miners but also local chiefs and citizens in general to establish transparency beyond its meaning as traceability. Rather than making actors transparent to the consumer it is the actors in the chain who get transparency from the state. They would always know who issued their licence, and how much was paid for it, they would

always know that the licence they have is indeed valid, and they would always have a bullet-proof way to validate their claims. Equally, it would be an easy way for inspectors to tell that the licence they are shown is indeed valid.

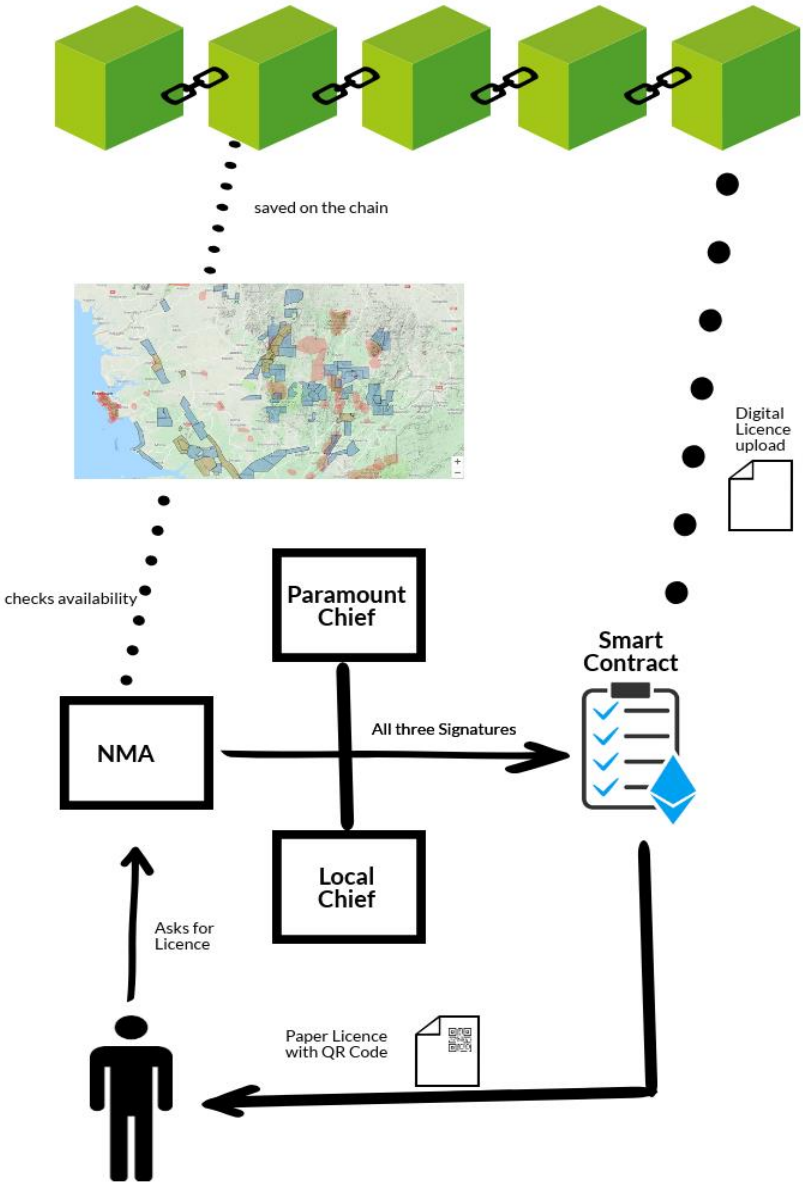

Figure 21 - Concept drawing of the Solution (own picture).

Of course, all of this hangs on the assumption that both miners and artisanal miners have constant access to the blockchain. This could be problematic, if they lacked a smartphone for example. This and several other challenges will be discussed in the next part.

Challenges and Risks

There are several challenges for realizing such a system. The first challenges are of a technical nature. As outlined above, the first technical challenge concerns the internet access of miners, supporters, and inspectors. It is simply unfeasible to expect every miner, supporter, and inspector to have a smartphone and the newest version of the Ethereum blockchain installed on it. The Ethereum blockchain contains millions of blocks and downloading the chain takes several hours even with uninterrupted internet access. In order to make the system more inclusive and accessible, this digital system could incorporate a function developed by the blockchain start-up Provenance (Provenance, 2016). Said solution would enable miners and inspectors to have access to the relevant information about the mining licence by simply sending an SMS message to the blockchain protocol. A condition would be the continued issuance of paper licences. Similar to the ChromaWay system, such a paper licence would contain a QR code, and several data strings like a mining licence code. The inspector or miner could then either scan the QR code and get direct access to the blockchain, or they could send the licence code to a specified number via SMS. The number to which the code is sent will be a node on the chain, controlled by a smart contract that responds automatically via SMS, and will confirm or deny the validity of the licence in question. This arrangement makes sure that miners and inspectors can use the system without having to download millions of blocks as it only requires basic mobile phones for sending SMS messages (DareDisrupt, 2019; GSMA, 2017). The same contract could also send additional information and inform the licence holder with an SMS message whenever their licence is about to expire.

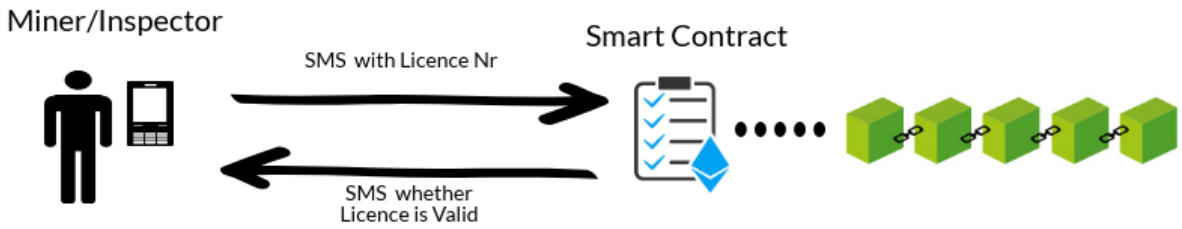

Figure 22 - Interaction between the Miner/Inspector and the Smart Contract (own picture).

Another technical challenge concerns the utilization of the Ethereum protocol, which we recommend. This is a distinction from the ChromaWay project which utilizes a permissioned blockchain. Broadly speaking, a permissioned blockchain trades public accessibility for transaction speed and

control over participants (Coppi and Fast, 2019, p. 8; Swanson, 2015, p. 8). While still publicly visible, only those people are allowed to join that have permission from the system administrator (Wust and Gervais, 2018). There are positive and negative aspects to both forms of blockchain that require careful evaluation.

We advocate for a usage of Ethereum technology for several reasons. First, the transaction speed problem is not detrimental for the issuance of mining licences. A waiting time of several minutes, or even hours, will presumably still be quicker than a non-automated licence issuance. This is even more true, considering that local chief and paramount chief could now sign licences digitally. Secondly, building a private or permissioned blockchain requires the running of own computational nodes. If these nodes are subjected to a blackout, the system collapses. Equally, if a majority of the nodes are corrupted, they can forge the chain. A public chain, like Ethereum, generates additional security because it is distributed over many more nodes, hence it will neither collapse nor be corrupted (Dannen, 2017; Decker and Wattenhofer, 2013; Wust and Gervais, 2018). Consequently, if the system was designed to gain trust amongst citizens, it seems prudent to take it out of the hands of the government.

On the flipside, if a false entry lands on a public chain, it cannot be rectified. A permissioned blockchain can do a hard fork more easily. What is more, a permissioned blockchain only does hardforks when it wants to. Putting the data on a public chain means that potential future hard forks will have to be taken into account. If a majority of Ethereum users decided to change their protocol, the cadastre system would have to follow suit to guarantee its security (Dannen, 2017). However, as changes in the protocol usually upgrade the system's capacity, this seems to be no disadvantage. As mentioned in the previous chapter, the next hard forks that Ethereum is planning to implement concern upgrades in speed and scalability without a loss in security (Buterin, 2016).

In summary, we believe that the disadvantages of Ethereum can either be bypassed or count for less than its potential benefits, such as a gain in public trust and a more stable and secure network. Permissioned blockchains are the preferred model for solutions that require quick transactions or control over participants (see above). Public blockchains, however, were specifically designed to enable transactions between actors that do not trust each other. We believe that the latter case is more appropriate for a solution that is built to enhance the trust of citizens and artisanal miners into the licence system.

The second set of challenges are of a socio-political nature. Implementing such an initiative

would require the collaboration of the Sierra Leonean government – more specifically, the National Minerals Agency (NMA). We are convinced that our solution would add the benefits of blockchain technology to the already existing system, broadening the coverage of the system and solving many inefficiencies.

From the government's perspective, there are many benefits: the costs and the time for the registration of the licences would be decreased, since many functions are automated via smart contracts. Further, blockchain technology would also make the system more accessible to miners and regular citizens. Indeed, it would also make it more accessible to international agencies. As a policy advisor for the Ministry of Mines told us: "a system that will dismantle this kind of challenge, where you have information not only with one agency but with many people, would be very valuable so that [e.g.] the EITI [Extractive Industry Transparency Initiative] could just check some data for themselves, instead of having to talk to me or to another agency" (Ministry of Mines, personal interview, March 19, 2019). The consultation of data does not require any blockchain account or wallet. The interaction with the land registry would not change since the blockchain operates only as back-end, meaning the cadastre could still be assessed the same way and look the same way but would now have all the aforementioned advantages. Thereby, the citizens' confidence in the government and the NMA might be greatly increased, and the interface with international entities like the EITI or the Kimberley Process Certification Scheme might be greatly facilitated.

Another challenge concerns the communication of the benefits of the technology. As we mentioned, the front-end of the cadastre will still look the same and also paper licences can still be given out. Hence, understanding the difference between traditional systems and the blockchain system is not necessarily visually possible. On the other hand, explaining the mechanism of blockchain technology to affected miners is probably a utopian idea. In a country where more than 60% of the workforce has not completed primary education (Gonzalez and Gutierrez, 2017), it cannot be expected that miners have the time or capacity to learn how blockchain technology works. The work of locally established NGOs will, therefore, prove crucial in communicating the benefits of the system credibly.

To summarize, the system we propose is a system designed to ensure transparency for the citizens, not the end consumers. It puts mining licences on the blockchain and automates their issuance with the help of smart contracts. Thus, it helps with the implementation of existing law

but does not interfere in the chain directly. We do not wish to design a system that could push one group or another out of existence, and we do not share some NGOs' conviction that for instance the *banabana* play a purely negative role in the chain. As we have shown in our analysis, they provide necessary functions in the system, can channel illicit gemstones back into legal hands, or get a better deal for miners than they would ordinarily get from their supporters. Our system is, therefore, designed to leave the overall social structure of the chain intact. The cadastre system is, therefore, only designed to optimize the legal framework surrounding the chain. It gives local communities a tool to enforce their participation in the system, it gives miners legal security on the validity of their document, and it gives inspectors an easy way to determine the validity as well. It also gives citizens the assurance that the state is not giving out licences through bribery, and in turn gives the state a tool to facilitate interaction with international agencies and prove the validity of their data to them.

Conclusion

In this thesis, we had a closer look on the artisanal diamond value chain of Sierra Leone. We were interested in the way diamonds work as an object of desire for consumers, suppliers, and NGOs. We were, furthermore, interested in ways to utilize blockchain technology outside the current discourse of governance, which, as we argued, is dominated by a 'transparency as traceability' paradigm.

We started with an overview of the historical development of Sierra Leone as a country, including the developments leading to the brutal civil war that tore the country apart. We outlined how the diamond sector developed in the country and influenced the violence during the war. Following this, we explained how this outburst of violence led to the current governance system in the sector, the Kimberley Certification Process Scheme. As we outlined, this system is anything but free from criticism, and despite notable improvements in the combat against conflict diamonds, civil society's pressure for improvement increases.

We proceeded with an outline of the actors involved in the artisanal diamond sector in Sierra Leone. From this, we continued by investigating the mysterious value of diamonds. Utilizing Slavoj Žižek's reading of Jacques Lacan, we concluded that the almost unique way that diamonds are extracted, as well as their physical properties, allows consumers to project properties of a 'gift', in a Derridean sense, onto them. This, in turn, cannot be captured by the logic of the Market. We postulated that this failure of the Market transforms diamonds into an object of desire for consumers. Extending this analysis from consumers to local actors, we theorized that this holds true for miners and other actors along the chain as well. We suggested that for miners diamonds are not merely an object of exchange but an object to project their dreams on. Caught in a continuous postponement of fulfilling their dreams, they are unwilling to leave the chain or to turn to other activities.

Equipped with this analysis, we evaluated how different NGOs problematize this situation. We examined how these NGOs are themselves often caught in a fantasy of transparency as the most important tool to 'fix' the problems in the sector. The way these NGOs put this into practice, is by attempting to make the diamond fully traceable along the value chain. With this, they want to cut illegal middlemen, give information to local actors, and consumers, who are expected to boycott unethical diamonds. We critically evaluated this as rooted in an imaginary picture of a harmonious sector with informed, rational agents, without power imbalances. Furthermore, we

criticized this approach to transparency as consumer-focused instead of focussing on local actors. We then turned to the way that this imaginary picture inspires the current technological discourse surrounding humanitarian interventions in Sierra Leone and beyond.

Finally, we introduced blockchain technology. After introducing the technology and its history, we looked at the already existing digital mining cadastre of Sierra Leone. We argued that, while the system has been a step in the right direction, it still faces a number of problems, some of which are of a technical, others of a social nature. We argued that the system lends itself for an improvement with blockchain technology, as such an improvement could be made without directly affecting any actor in the chain. It would merely change the back-end of the system and ensure that local actors cannot be ignored when it comes to the issuance of licences, and that licences cannot be forged or manipulated. Unlike traceability systems it, therefore, avoids the imaginary assumption of 'fixing' the whole diamond sector at once, and gives local actors transparency from the state, rather than subjecting them to a transparency demand from consumers. In contrast to a traceability system, it is also technically feasible with current technology.

Ultimately, answering the question how diamonds are desirable requires a multi-faceted answer. The common explanation of their rareness is certainly not sufficient in this regard. That diamonds are at the centre of desire for so many actors, is not a coincidence. For consumers it is the result of a complex array of facets that are inherent in the diamond, socio-cultural factors surrounding it, and certainly also clever marketing strategies that put these aspects to the forefront. For miners and other actors along the chain, the same factors allow them to project their dreams upon diamonds, especially those diamonds that are not yet mined. This in turn calls NGOs to the field, for whom diamonds become an object of desire, too, in the sense that they project potential development for the country onto them. The concept of 'transparency' as a means to realize this desired state, functions as a fantasy to save this notion. Whether all of these aspects would hold for other countries in which diamond mining is happening, is a question worth exploring. The same holds true for other gemstones or precious metals. Our analysis could be deepened - or potentially also challenged - by an analysis of such minerals as gold, sapphires, rubies, emeralds, etc.

We have also explored technology as a tool to open new governance paradigms rather than merely as a tool to implement old ones. One thing that did become clear during our analysis is that technology is not a wonder-weapon that can solve all problems of the diamond trade in Sierra Leone. On the contrary, if utilized in the wrong way, it may do more harm than good in the given

context. However, if used appropriately and carefully, we are convinced that it can improve the governance of the sector beyond the current idea of traceability, making it more secure for the miners, and giving local actors a voice in the process. Whether an implementation of such a system will ever occur is hard to say. However, if it did, it would surely provide ample material for new research and could surely shine light on the interaction of technology and socio-cultural forces in this context and perhaps even beyond.

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