

## Master Thesis

# **“Dynamic behavior of public support for gold-mining industry and sustainable development”**

**Name:**

Efstathios Spyros

**Student number:**

1010211

**Supervisor:**

I.L. Bleijenbergh (Inge)

**Second examiner:**

A.M.A. van Deemen (Ad)

**Date:**

19/11/2018

**Education program:**

Master's in Business Administration, specialization: Business Analysis and Modelling

**University:**

Radboud University

**Faculty:**

Nijmegen School of Management

## Table of Contents

<b>1. Introduction .....</b>	<b>3</b>
<b>2. Theory.....</b>	<b>8</b>
<i>Factors shaping local communities behaviour towards gold-mining activities .....</i>	<i>8</i>
<b>3. Methodology.....</b>	<b>21</b>
3.1 Why case study research? .....	21
3.2 Why the case study of gold-mining in Skouries, Chalkidiki? .....	21
3.3 Data collection methods.....	24
<b>4. Results.....</b>	<b>26</b>
4.1 Factors shaping local communities' behavior towards gold-mining activities in Skouries, Greece .....	27
4.2 Effect of Sustainable Development on changing locals' stance towards gold-mining in Skouries.....	34
4.3 Communication, environmental and socio-economic policies to be implemented by mining companies aimed at promoting sustainability and increasing public support for their projects.....	37
4.3.1 Communication policies .....	37
4.3.2 Socio-economic policies .....	40
4.3.3 Environmental policies .....	43
<b>5. Conclusions.....</b>	<b>48</b>
<b>6. Discussion .....</b>	<b>53</b>
<b>References.....</b>	<b>57</b>
<b>Appendix 1 Interview questions .....</b>	<b>62</b>
<b>Appendix 2 Other sources of information.....</b>	<b>65</b>

## 1. Introduction

The objective of this case-study research is to identify and represent, with the help of System Dynamics methodology, the key factors that influence Greek community's behavior towards gold mining in Skouries, Chalkidiki, Greece. System Dynamics is a powerful tool in the creation of feedback theories (Luna-Reyes & Andersen, 2003). These feedback theories will later help us understand better what communication, environmental and socio-economic policies put forward by gold-mining companies, have the potential to ensure public support for their projects, especially by leveraging sustainable development as a differentiator in their relationship with local communities. This decision of mine to focus on the corporate perspective of gold-mining, comes from the fact that often, despite governmental support for mining projects, local communities' resistance can thwart their materialization. I believe that the gold-mining sector has great potential for the Greek economy and with these policy-recommendations that will come out of my research I hope I will contribute to the successful operation of gold-mines in Greece and consequently to the future economic development of the country. As already mentioned, these policies are sustainability-related because I am confident that sustainability as a process has the potential to influence public opinion. In the corporate mining, Hilson & Murch (2000) claim that sustainable development requires that mining companies use best practices when addressing important environmental and socio-economic issues. It can be defined as:

*“The development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED), (1987).*

Therefore, sustainable development can be a very useful tool for gold mining companies in their struggle to explain how mining effects can turn into great opportunities for the future economic and social development of the areas they operate. Current literature fails to explain in depth this particular relationship between sustainable development and public opinion when it comes to gold mining activities in developed countries, and therefore I aim at shedding light on this issue. After all, one should keep in mind that people change their stated beliefs when facing persuasive arguments posed by others (Nowak & Szamrej, 1990).

Much of the equipment we use in our everyday life is produced using raw materials coming from the mining industry (Carvalho, 2017). This equipment varies

from simple aluminum packing foil to more complex objects like cell phones or computer parts. From the ancient times till today, the demand for minerals has been constantly growing and as the global population increases, this trend is expected to continue with Asian countries like India and Taiwan leading this trend (Kesler, 2007). The importance of mineral exploitation has been pointed out by other academics too, with Walser (2000) supporting the view that it (mineral exploitation) plays a vital role in the economic development of developed and under certain conditions of developing countries. The common mining practice used by mining companies until very recently could be summarized in a few steps: obtaining a license, digging the ore, selling the metal, and once the deposit is exhausted, walking-away and starting another mining project somewhere else (Carvalho 2017; Jain et al. 2016; EB 2017). This practice has been amplified by the fact that up until recently, especially in developing countries, mining exploitation was taking place without any long-term planning or supervision by local governments and therefore the environment was relying exclusively on the “good will” of mining companies. The latest technological breakthroughs in the mineral extraction methods and machinery have allowed companies to operate in ways that have increased the volume, the range and the intensity of the change they bring to the environment.

Mining projects require road constructions, excavations and waste disposal sites that have direct consequences such as: vegetation and soil destruction, relief distortion and the creation of unfavorable ecological conditions in the area they take place.

As mentioned earlier, the mining industry is related to the economic growth of a country and therefore it affects society itself through the employment opportunities it offers to the local population, the taxes it contributes to local and national economy, infrastructure projects etc (Walser, 2000). However, this of course should not undermine the need to protect the environment before, during and after mining projects take place. Nature is the provider of a number of products and services to the human kind and contributes to our quality of life. To do so, I believe it is crucial that prior to any mining activities, special attention is paid on how to minimize the environmental impact during their materialization phase, but also on the development of a proper restoration plan once these activities are concluded. Right demarcation, minimization of the area subjected to mining, usage of the latest excavation methods which minimize human and environmental exposure to dangerous substances released during mining

and implementation of the appropriate restoration policies are I believe all key parts of a planning that should be drawn by both the government and mining companies.

Gold-mining in particular, has been the subject of debates in many countries mainly because of its association with arsenic release to the environment. Arsenic is a toxic element with carcinogenic effects to humans (Curtis & Mousavi, 2014). Despite this drawback, gold demand has always been present in the world thus encouraging gold-mining activities. Gold is a metal that was highly valued since the old times because of its scarcity, durability, and its characteristic yellow color, reminiscent of the sun, which some of the ancient civilizations worshiped as a God (Butterman & Amey, 2005). Moreover, it has virtually pure and workable state, whereas most of other metals tend to be found in ore-bodies that pose some difficulty in smelting. Gold's high export value makes it particularly attractive from the economic perspective for exploiters. Today, gold has turned into an investment commodity playing an important role in commercial transactions (Sawkar, 2010). Approximately 2500 tons of gold are being mined on a yearly basis (Tully & Lucey, 2006). It is also valuable from a social and emotional point of view because it is often associated with power, thus going beyond its practical use as a metal.

Nowadays, gold mining industry keeps growing globally despite a small drop in gold demand during the last two years. More than 50% of gold demand today is for the production and consumption of jewelry and it has been sharply rising particularly in fast-growing economies like China and India (World Gold Council, 2018). These countries have seen a significant increase in wealth and income level which drives the consumption of gold. Gold demand is also driven by the technology sector because of its use in electronics like smartphones and industrial applications. Additionally, gold draws investors' interest because of it being an asset that reinforces the performance of investment portfolios. Emmrich & McGroarty (2013) claim that gold bullion is the best form of gold investment for international investors and a 10% portfolio allocation to gold bullion is the best of the alternatives they suggest. By being a precious metal with a high value and growing demand around the world, gold constitutes a significant part of mining industry that both developed and developing countries decide to invest on. Every country in the world is taking active steps to improve production of gold metal with Australia having increased production by 782% and North America by 460% between 1980 and 1990 (Sawkar, 2010). Greece, as a developed and at the same time

rich in gold-reserves country, I believe represents a very attractive “destination” for gold-mining companies that could turn it into a major gold-producer country. This may in turn help the country to finally exit the recession it has been struggling with for almost a decade.

Despite the importance of gold for both investors and national economies, meeting the market demand for mineral commodities comes short of meeting society’s expectations of the industry (Starke, 2002). Mining activities in all of their stages have an impact on natural environment as well as on the socioeconomic and cultural aspects of society (Kuan & Ghorbani, 2016). Therefore, from my perspective, society’s expectations have environmental, cultural and socio-economic aspects and I believe that managing to fulfill these expectations could facilitate public support for mining projects. Nevertheless, the prioritization of these expectations may vary between developed and developing countries. For instance, in the developing world, environmental laws are still in their infancy and accompanying enforcement programs are not effective enough (Kumah, 2004). As a result, mining companies in such countries often end up not contributing to the environmental enhancement of the areas they operate. In developed countries, environmental legislation is normally existent but not much information is available regarding the actual programs mining companies implement or the exact expectations local communities and the society itself have from them.

In Greece, which according to its Gross Domestic Product (GDP) belongs to the developed world, the deep economic crisis has made it a priority for the latest governments to allow gold-mining projects to take place, often “clashing” with society’s expectations. This prioritization comes from the large gold deposits that are believed to be located in Northern Greece and especially in the Chalkidiki area, that have attracted considerable foreign investments from multinational mining companies in recent years. Mining industry has historically played a vital role for the Greek economy and kept growing despite the economic recession, representing today 3,4% of the country’s GDP (Kefalas, 2017). It is noteworthy that there has never been a detailed evaluation of the actual mineral reserves located in the country, but the latest estimations assess the total value of Greek mineral reserves standing to €2,4 tln, with the country currently exploiting only 0,15% of them (CNN Greece, 25/4/2017).

Although the contribution of mining industry to the Greek economy is already considerable and has the potential to increase further, there are certain factors hindering this from happening. More specifically, when it comes to gold-mining activities in the area of Chalkidiki, local communities' resistance to gold-mines has been preventive to any mining company that attempted to operate gold-related projects in the last 30 years (Mpamiatzis, 2013). The reasons for this poor support vary, but I believe they are mainly attributed to people's lack of trust in mining companies' commitment to respect the environment and preserve the quality of living of the local population. Lack of trust exists also towards the state authorities over their ability and willingness to supervise mining industry mainly because of the corruption and lack of transparency in the procedures under which mines have been passed over to mining companies' control.

In this master thesis, I am going to study the case of local community's behavior towards gold-mining in Skouries, Chalkidiki. This project had the potential to turn Greece into a major gold producer in Europe since in that area there is a world-class gold-copper porphyry deposit containing 3.8 million ounces of gold and 776,000 tons of copper (Kolonas, 12/9/2017). Because of this great importance of Skouries and its neighbouring Olympiada (also gold-rich area) from mining perspective, significant investments have been made by mining companies since 2004 that the gold mines of this area were transferred to "Hellas Gold S.A." by the law 3220/2004 (Gov. 15A/28.1.2004). As of September 2017, Hellas Gold S.A. (subsidiary of Eldorado Gold) claimed that its investments in Skouries and Olympiada alone, had surpassed €750 mln and the company had been employing more than 1,500 people on a permanent basis (Proto Thema, 2017). However, according to the largely adopted view, the main concerns of local communities and NGO's in this case were related to the environmental impact of mining because of the release of arsenic to the environment and the deforestation of a virgin forest, home to a wide variety of plants and animals. Also, concerns rose among the locals over the impact of gold-mining on tourism sector because the broader Chalkidiki area is one of the most popular tourism destinations in the country. More than 1,2 mln people visited Chalkidiki in 2017 (Syrmatsis, 2017). Local residents and NGOs were afraid that downgrading of the whole area would be inevitable and therefore they decided to take action and tried to violently prevent the gold mining from taking place. This violence was expressed in the form of clashes between locals and police with an arson attack taking place at the company's facilities

in Skouries in 2013, leading to the partial destruction of its equipment. These events drew the attention of media across the country and abroad with the company eventually suspending all of its activities in Greece as of September 22<sup>nd</sup> 2017.

Some of the main questions to be answered through this case study research are:

1. What are the factors that shape local communities' behavior towards gold-mining activities in Skouries?
2. What is the potential effect of sustainable development on influencing people's perception of gold-mining projects in Skouries?
3. What communication, environmental and socio-economic policies of mining companies have the potential to promote successfully sustainable development and eventually curb public resistance to gold-mining in Skouries?

## 2. Theory

### *Factors shaping local communities behaviour towards gold-mining activities*

Before we get to explain the actual factors that influence local communities' behavior towards gold-mining projects, it is important to mention that there is a gap in literature between gold-mining in developing and in developed countries. More specifically, I noticed that while current literature has focused on gold-mining and its environmental implications for both developed and developing countries, it failed to do so when it comes to socio-economic implications in developed ones. This thesis may add to filling this gap. So, our knowledge below is mostly based mainly on gold-mining in developing countries.

In the socio-economic sphere of mining activities, literature suggests that there are plenty of factors affecting local communities' behavior towards mining projects. A major one is the extent to which mine development disrupts social structures and production systems (Rosenfeld Sweeting & Clark, 2000). The sudden appearance of a major economic development can lead to disruption of traditional social and production systems, because we witness the introduction of cash economy, new cultures and values, alcohol and imported food (Rosenfeld Sweeting & Clark, 2000). Aside from the dangers to human health coming from mining that may lead to displacement of local



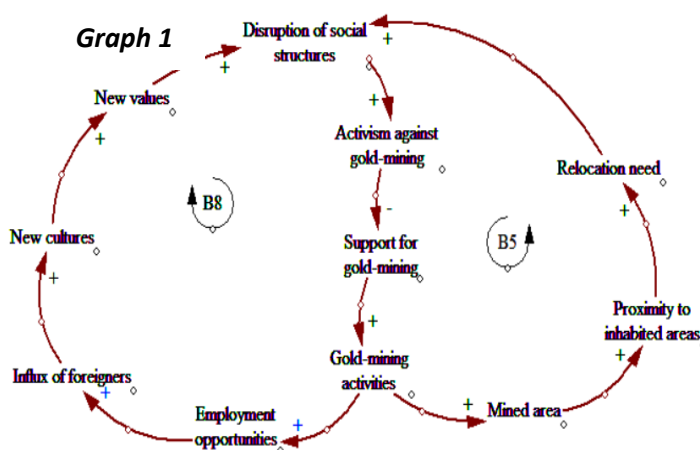
communities, mining projects also displace local communities because they limit locals' access to traditional lands important for their survival and well-being. This is quite common in developing countries where indigenous people are strongly attached to their land since it constitutes the “legacy of the past” (Rosenfeld Sweeting & Clark, 2000). Whereas relocation of locals is necessary, the way it is conceptualized and materialized seems also to shape local communities' level of acceptance of mining activities. Involving local communities in the process of determining where they will be re-located with the relocation program, will help reduce any tensions that would appear in case of unilateral

decisions made by the mining company

(Rosenfeld Sweeting & Clark, 2000).

There have been cases where locals were even forced to relocate to inappropriate locations, receiving little support in reestablishing their

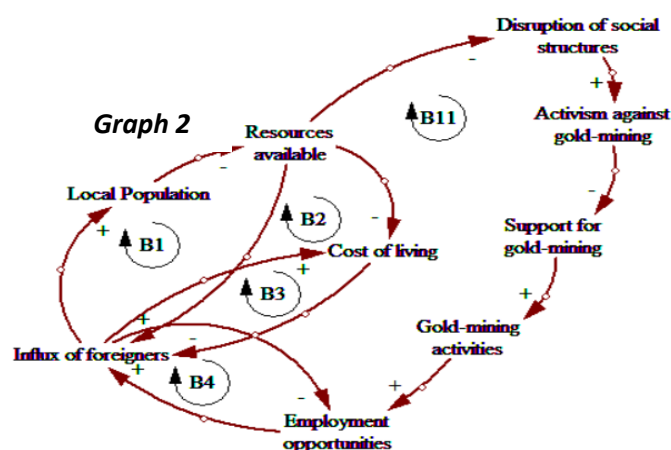
communities (Rosenfeld Sweeting & Clark, 2000). For example, in Sierra Leone, a mining company forcibly moved about 5,000 people to new settlements that did not have sufficient water, trees, farmland and sanitation (Rosenfeld Sweeting & Clark, 2000). This triggers activism against gold-mining and reduces support for it. As shown in the “disruption of social structures” loop (B5) of **Graph 1**, public support for gold-mining projects leads to an increase in gold-mining activities which in turn leads to an expansion of the area that is subjected to mining. The larger the mined area, the closer mining gets to inhabited areas which increases the need for relocation of local population. However, depending on the way this relocation takes place, social structures can be disrupted. The higher the degree of this disruption, the higher the activism against gold-mining which in turn reduces support for gold-mining. The “new cultures” loop (B8) depicts the causal relationship among various factors. For example, more gold-mining activities will create more employment opportunities which will in turn increase the influx of foreigners to the area and finally bring new cultures to the local communities. These new cultures facilitate the entry of new values and may lead to disruption of social structures. As mentioned before, when this disruption grows,



activism against gold-mining increases. When activism is high, support for gold-mining drops, thus leading to less gold-mining activities.

Demographic changes caused by the large number of foreign or non-local mine employees being brought to an area due to mining projects, can seriously affect the social balance of local communities (Rosenfeld Sweeting & Clark, 2000). In some areas, local people have complained that miners have demonstrated aggressive and disrespectful behavior towards them (Rosenfeld Sweeting & Clark, 2000). There are cases that new mine settlements are consisted entirely of men and this has led to drinking, gambling and prostitution (Rosenfeld Sweeting & Clark, 2000). Local communities are often not only concerned over the influx of foreign workers itself, but also about their tendency to encourage further migration of people from other parts of the country or region, seeking work or other economic opportunities related to the mine (Rosenfeld Sweeting & Clark, 2000). For example, in Serra Pelada, Brazil, since the moment that gold was first discovered, 400,000 people have moved to the area seeking riches, with more than 100,000 people still living right next to the gold mine (Rosenfeld Sweeting & Clark, 2000). In this way, resources and opportunities available to the locals get limited. In developing countries, these resources may have the form of water supplies or even food because animals available for hunting are getting reduced. Opportunities on the other hand, are mainly related to the jobs available to locals but also to the new comers. Rolfe et al., (2007) claim that some of the negative impacts of mining activities include unaffordable housing for the local communities, exhaustion of natural resources and increased cost of local production that are often felt in the locals' everyday life.

All these factors form a number of loops in **Graph 2** and demonstrate the impact of the influx of foreign workers in ore-rich areas of developing countries. The “employment” loop (B4) explains that when employment opportunities increase, more foreigners flock to the mining area. The “Cost of living” loop (B3) explains that when influx of foreigners



increases, cost of living rises too. When cost of living rises, fewer people will flock to the area as its attractiveness drops because of the higher costs. In the “population” loop (B1), population is positively affected by the newly-arrived workers, but this often leads to less resources available to locals (e.g. animal preys that could be used as food source or water). This again reduces the influx of foreigners since the amount of resources available in the mining area cannot support the existence of more people. Resources available affect negatively cost of living too. This is expressed in the “resources” loop (B2) where the less the resources available, the higher the cost of living. With higher costs of living, less people will move to the area and local population will decrease, thus causing an increase of resources available. Finally, in “support for gold-mining” loop (B11), gold-mining activities create more employment opportunities that increase the influx of foreigners to the area. As a result of this influx, local population grows and resources available decrease. This decrease can lead to disruption of social structures and stimulate activism against gold-mining. If activism is high, support for gold-mining drops and gold-mining activities drop too.

New technologies supported gold-mining industry’s effort to expand to new gold areas around the globe (Mudd, 2007), while the potential hazards to human health remain. Since the gold mining boom in the late 1970’s, the efforts put forward by gold-mining companies to explore more gold were facilitated by its real price rise, the development of carbon-in-pulp (‘CIP’) technology, and the evolution in large-scale bulk earth-moving vehicles and mining techniques (Mudd, 2007). Potentially hazardous, but favorable from the economic perspective, the regular modern method of processing gold (Au) is cyanidation (Curtis & Mousavi, 2014). Carvalho (2017) suggests that in gold mining, there is also a method that aggregates gold dust after its segregation from the placer deposit or from the ore-bearing rock and is based on mercury. However, both of these processes are very toxic to the artisanal community and to the environment (Carvalho, 2017). This opinion is also shared by Swenson et al., (2011) who claims that the current methods of gold mining cause major environmental issues like deforestation, release of heavy metals, acid mine drainage, as well as air and water pollution from arsenic (As), cyanide, and mercury (Hg) contamination. The weathering and erosion of minerals containing arsenic result in its release into surface and groundwater resources, causing contamination (Curtis & Mousavi, 2014). Adverse health effects associated with chronic exposure to arsenic-contaminated drinking water

are well established (Pearce et al., 2010; Centeno et al., 2007). This toxicity of gold-mining waste has led to a growing activism and conflicts in Indonesia in recent times after the Grasberg mine reportedly dispensed over 40 million tons of tailings into the Ajkwa River, posing a major environmental and health risk to the surrounding ecosystem and communities (Kumah, 2004).

In addition, Herrera et al., (2017) have found that living close to open-pit mines could increase the respiratory disease burden in children, thus making the proximity to gold-mines another factor affecting local communities' quality of life. Aswathanarayana (2003) explains that mining in its broader context, is related to physical, chemical, biological and mental hazards for people. Physical hazards include noise, heat, vibrations, falls and explosions, and various forms of dust, aerosols and fine particles with resulting fibro-genetic and carcinogenic effects (Aswathanaryana, 2003). Chemical hazards come from chemical pollutants like carbon monoxide in water, solid wastes and air (Aswathanaryana, 2003). Biological hazards caused by living organisms such as fungus, bacteria and parasites are more common among mine workers in developing countries with poor standards of hygiene and sanitation. Mental hazards include claustrophobia, anxiety and tension (Aswathanarayana, 2003). Fatigue and other disorders linked to shift work are other potential problems among mine workers (Aswathanaryana, 2003). Therefore, the proximity of gold-mining projects to residential areas and the level of exposure of the locals to the hazards that these projects entail, may very well influence the level of public support for gold-mining.

On the other hand, unlike renewable resources like water, mineral resources are non-renewable and this means that at some point they will be depleted (Yu, Zhang, & Zhou, 2008). Organizations such as the International Council on Mining and Metals (ICMM), call for mining activities and their products to aim at a positive long-term contribution to human and ecosystem well-being (ICMM, 2012; Kuan & Ghorbani, 2016). This is something that sustainable development seems to be able to do as one of its most common definitions is the one from the Brundtland Commission in 1987 which defined sustainable development as:

“A development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987).

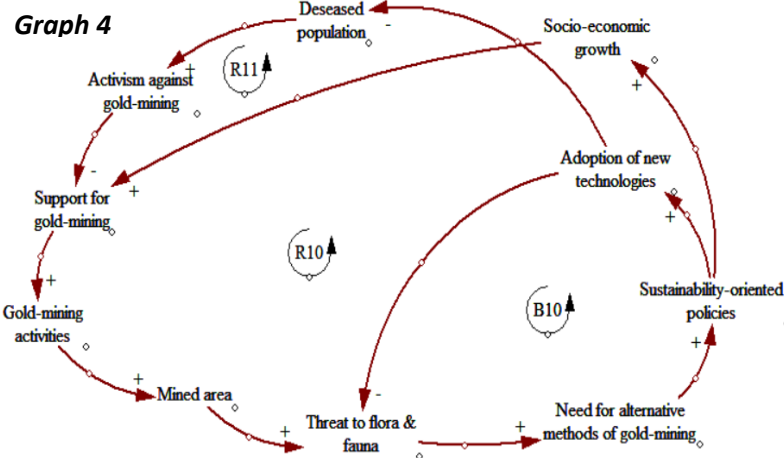
The World-Wide Fund for Nature (WWF), defined it as:



higher the support for gold-mining. In exactly the same way like the R8, can be explained the “toxicity” loop (R2), with the only difference being that proximity to inhabited areas is followed by “toxicity passed on to humans” instead of “mental disorders”. R1 or “need for alternative methods” loop, explains that when gold-mining activities increase, mined area increases and proximity to inhabited area increases too. This can cause mental disorders that lead to greater need for alternative methods which in turn increase sustainability-related policies. These policies lead to higher degree of adoption of new technologies that can reduce the deceased population variable. When deceased population drops, activism drops too, thus leading to higher support for and volume of gold-mining activities. In the same way, R9 or “deceased population” loop is explained with the only difference being that between “proximity to inhabited areas” and “need for alternative methods” variables, stands “toxicity passed on to humans” instead of “mental disorders”. The “adoption of new technologies” (B7) loop suggests that when toxicity gets higher, the need for alternative methods gets higher, thus leading to more sustainability-oriented policies and finally to a higher degree of adoption of new technologies. B6 works the same way but the “toxicity passed on to humans” variable is replaced by “mental disorders”.

Gold-mining activities are closely related to dangers for flora and fauna (Eisler & Wiemeyer, 2004). This relationship is depicted on **Graph 4** which contains 3 feedback loops. “Mined area” loop or R11 explains that gold-mining activities lead to a larger mined area and increase the threat to local flora and fauna. This increased threat will require more alternative methods for gold-mining, thus leading to the implementation

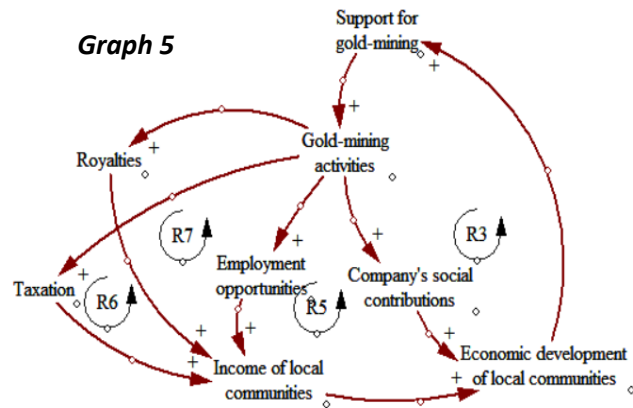
of more sustainability-oriented policies. These policies bring more new technologies in gold-mining and the deceased population drops. When deceased population drops, activism against gold-mining decreased too and support for gold-mining grows. If support for gold-mining grows, more gold-mining activities will occur. “Socio-



economic growth” loop (R10) reflects the following situation: more gold-mining activities cause the size of the mined area to grow and consequently the threat to flora and fauna increases. This increased threat calls for alternative methods of gold-mining and for more sustainability-oriented policies that will lead to higher socio-economic growth. This growth will increase support for gold-mining and more gold-mining activities will take place. In “threat to flora and fauna” loop (B10), the higher the threat to flora and fauna, the greater the need for alternative methods of gold-mining. When the need for alternative methods of gold-mining get higher, so do the sustainability-oriented policies implemented by the mining company. These policies cause the adoption of new technologies to rise, leading eventually to smaller threat to flora and fauna.

The strong positive economic impacts from mining are royalties and taxation, while there is a pressure to provide services on the state or local government (Ivanova, 2014). The degree of delivering these extra services appears to influence local communities’ behavior towards mining activities. According to Rolfe et al (2011), some of the direct impacts of mining activities on regional economies are the expenditures companies make on contractor and employee wages, salaries for extraction development and exploration activities, community infra-structure such as health centers and increased royalty payments and tax revenues to all levels of government. Moreover, many developed countries have used and still use natural resources as growth engine because they present abundant opportunities for diversification of their economies (Kumah, 2004). For example, gold mining in Victoria and Western Australia attracted investment funds (foreign and domestic) not only for mining but for other industries as well. More specifically, in Australia’s case, gold extraction has contributed to the development of regional infrastructure (roads, railways, telegraph facilities etc), thus boosting the rise of other economic activities, like agriculture, manufacturing, and transportation (Doran, 1984; WBCSD & IED, 2002).

All these economic and social aspects of gold-mining are integrated into **Graph 5**. In “taxation” loop (R6), when gold-mining activities increase, so does the taxation money received from the mining companies. When taxation money increases, the income of local communities



increases too, leading to greater economic development of local communities. This will in turn increase support for gold-mining and more gold-mining activities will take place. Similarly, “royalties” loop (R7) is explained in the following way: the more the gold-mining activities, the more the royalties, the more the royalties the higher the income of local communities and the greater the economic development of local communities. This increased economic development will increase support for gold-mining and gold-mining activities will grow again. Gold-mining activities also cause an increase in the company’s social contributions (e.g. infrastructure projects) as shown in “social contributions” loop (R3). When these contributions grow, local communities get developed faster economically and therefore support for gold-mining grows too. Finally, more gold-mining activities will take place as there will be more economic and social interest in the materialization of such projects. “Economic development” loop or R5 describes the following relationships: high volume of gold-mining activities increases employment opportunities for locals, thus increasing the income of local communities. This higher income leads to greater economic development of local communities and amplifies support for gold-mining. When support for gold-mining grows, more gold-mining activities are expected to take place.

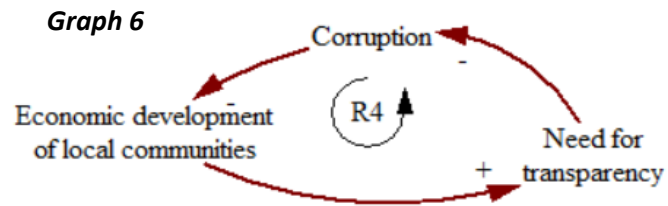
In many cases, the exploitation of countries’ natural resources has failed to diversify economic growth or support the development interests of poor communities (Newenham Kahindi, 2011). According to Kahindi (2011), the source of this failure comes from corruption among the ruling elites, weak governance, poor judicial capabilities to enact or enforce rules and laws and the failure to effectively use mining-generated taxation revenues to improve local communities’ quality of life (Newenham Kahindi, 2011). Transparency leads to lower levels of corruption even in societies



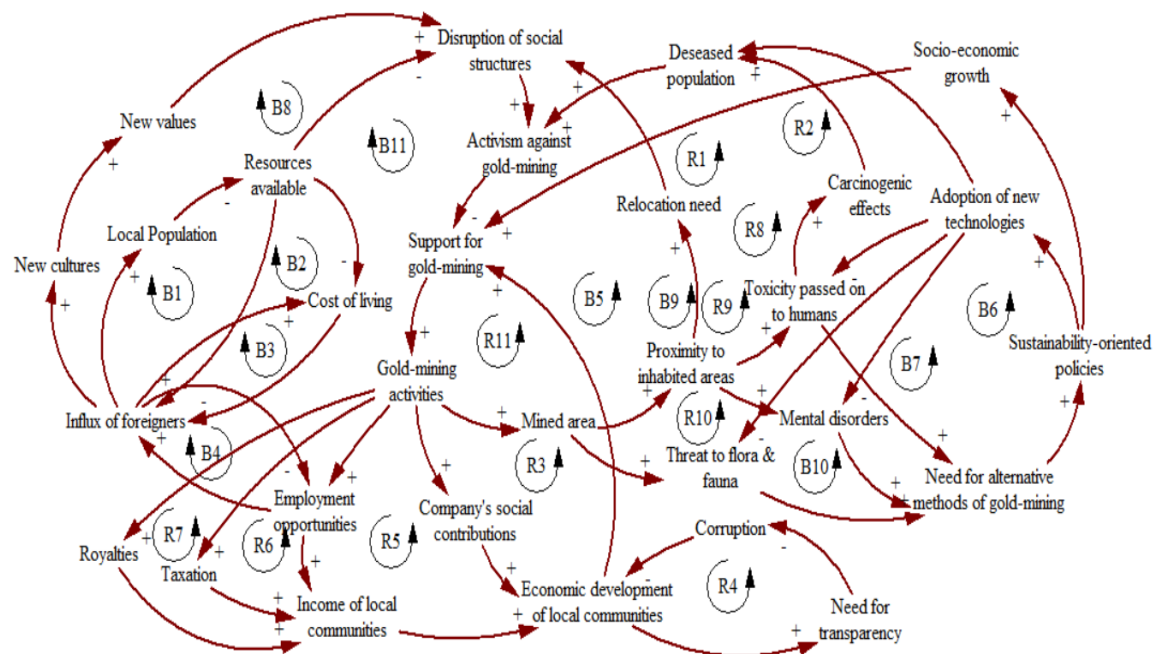
where social inequality is high (Peisakhin & Institute, 2012).

In **Graph 6**, we see that the economic development in developing countries creates

the need for transparency among the local authorities and the mining company. This increased level of transparency results in lower corruption rates because corrupted people cannot embezzle money easily anymore without it being noticed. Consequently, when corruption drops, more economic development is brought to the local communities.



Based on the literature above, I created a Causal Loop Diagram (CLD) depicting the factors that influence local communities' stance towards gold-mining projects in developing countries:



- **Balancing Loops:**

B1: The higher the population, the less the resources available. The less the resources available, the less the influx of foreign workers. Lower levels of influx of foreign workers cause a drop in the population.

B2: The higher the population, the less the resources available and the higher the cost of living. When cost of living rises, the influx of foreign workers drops and the population eventually decreases.

B3: The higher the influx of foreign workers the higher the cost of living. Higher cost of living also means lower influx of foreign workers.

B4: The higher the influx of foreign workers the less the employment opportunities available. When employment opportunities drop, the influx of foreign workers will drop as well.

B5: The more the gold-mining activities the larger the mined area and the higher the proximity to inhabited areas. The higher the proximity to inhabited areas, the higher is the relocation need and the higher the disruption of social structures. Once social structures are disrupted, activism against gold-mining erupts and support for gold-mining drops, causing eventually gold-mining activities to get reduced.

B6: The more mental disorders affect locals, the higher the need for alternative methods of gold-mining. When the need for alternative methods of gold-mining rises, so do sustainability-oriented policies. These policies lead to the adoption of more new technologies that will eventually bring a reduction to mental disorders.

B7: The higher the need for alternative gold-mining methods, the more the sustainability-oriented policies undertaken and the higher adoption rate of new technologies. The introduction of more new technologies will reduce toxicity passed on to humans. Less toxicity means smaller need for alternative mining methods.

B8: New cultures lead to an increase in the new values entering local communities. This will in turn lead to higher disruption of social structures and this disruption intensifies activism against gold-mining. As a result, support for mining-gold-mining activities drops and gold-mining activities decrease. When gold mining activities drop, employment opportunities drop too and consequently the influx of foreign workers gets smaller.

B9: The more the gold-mining activities, the larger the area subjected to mining. This increase gold-mining's proximity to inhabited areas, thus increasing the toxicity passed on to humans. The more the toxicity, the more the carcinogenic effects of gold-mining on the locals and thus the greater the deceased population. When more people get sick, more activism against gold-mining is expected to take place and the support for gold-mining will drop, bringing fewer gold-mining activities in the area.

B10: The higher the threat to flora and fauna, the higher the need for alternative methods of gold-mining. When this need rises, more sustainability-oriented policies will be introduced. These policies bring more new technologies and finally threat to flora and fauna gets diminished.

B11: When gold-mining activities increase, so do the employment opportunities that are being offered. These extra job opportunities will make the area more attractive and therefore the influx of foreigners will grow. Larger influx of foreigners leads to an increase of the local population and thus resources available are getting diminished. This in turn will cause disruption of social structures and activism against gold-mining will rise. When activism against gold-mining rises, support for gold-mining drops and consequently less gold-mining activities will take place.

- Reinforcing Loops:

R1: The more the gold-mining activities, the larger of mined area, which in turn increases the proximity to inhabited areas. When the proximity is high, mental disorders caused to humans get higher, thus leading to an increase of the need for alternative methods in gold-mining. When this need is high, more sustainability-oriented policies will be implemented, causing an increase in the adoption of new technologies. The more new technologies are used, the less the deceased population and consequently the less activism against gold-mining. Less activism means more support for gold-mining and eventually more gold-mining activities will occur.

R2: The more the gold-mining activities, the larger of mined area, which in turn increases the proximity to inhabited areas. When the proximity is high, toxicity passed on to humans gets higher, thus leading to an increase of the need for alternative methods in gold-mining. When this need is high, more sustainability-oriented policies will be implemented, and socio-economic growth will be reinforced. Higher socio-economic growth leads to higher support for gold-mining and finally to more gold-mining activities.

R3: The more gold-mining activities, the more the company's social contributions to the locals and the higher the economic development of local communities. When economic development of local communities rises, support and need for more gold-mining activities rise.

R4: Economic development of local communities requires higher transparency. Higher transparency reduces chances of corruption. When corruption is low, economic development grows.

R5: More gold-mining activities mean more employment opportunities and thus higher income of local communities. When the income of local communities rises, the economic development of local communities follows the same trend leading to greater support for gold-mining. This growing support eventually brings more gold-mining activities.

R6: The more the taxation revenues from gold-mining, the higher the income of local communities and the bigger the economic development of local communities. When economic development grows, support for gold-mining grows too and more gold-mining activities will take place. When gold-mining activities increase, taxation revenues grow too.

R7: The more the royalties from gold-mining, the higher the income of local communities and the bigger the economic development of local communities. When economic development grows, support for gold-mining grows too and more gold-mining activities will take place. When gold-mining activities increase, royalties grow too.

R8: The more the gold-mining activities, the larger of mined area, which in turn increases the proximity to inhabited areas. When the proximity is high, mental disorders caused to humans get higher, thus leading to an increase of the need for alternative methods in gold-mining. When this need is high, more sustainability-oriented policies will be implemented, and socio-economic growth will be reinforced.

Higher socio-economic growth leads to higher support for gold-mining and finally to more gold-mining activities.

R9: The more the gold-mining activities, the bigger the size of mined area gets, which in turn increases the proximity to inhabited areas. When the proximity is high, the toxicity passed on to humans is higher, thus leading to an increase of the need for alternative methods in gold-mining. When this need is high, more sustainability-oriented policies will be implemented, causing an increase in the adoption of new technologies. The more new technologies are used, the less the deceased population and consequently the less activism against gold-mining. Less activism means more support for gold-mining and eventually more gold-mining activities will occur.

R10: When gold-mining activities rise, so does the size of the mined area. This increases the threat that gold-mining poses for flora and fauna and therefore the need for alternative methods of gold-mining rises. When this need grows, it brings more sustainability-oriented policies, thus leading to the achievement of higher levels of socio-economic growth. With more socio-economic growth, support for gold-mining rises and more gold-mining activities will take place.

R11: When gold-mining activities rise, so does the size of the mined area. This increases the threat that gold-mining poses for flora and fauna and therefore the need for alternative methods of gold-mining rises. When this need grows, it more sustainability-oriented policies, thus leading to the adoption of new technologies. The introduction of new technologies will decrease the deceased population and will reduce activism against gold-mining activities. With less activism against gold-mining, more gold-mining activities will take place.

This CLD will serve as a guide in developing the final CLD that will refer to the factors shaping the behavior of local communities towards gold-mining in a developed country, namely Greece. This is important because via the final model we will improve our current understanding of locals' behavior towards the gold-mining project in Skouries and we will hopefully identify the key points of leverage the company could use to influence positively public support for its project. These particular factors shaping local communities' behavior towards gold-mining in Skouries is one of the three research questions I plan to answer through this thesis. I also plan to explore whether the variables appearing on the CLD derived from literature apply to developed countries too, thus identifying core differences in the societies' expectations between the developing and developed world. Of course, new variables are expected to appear. The interviews I will conduct with a number of parties involved in the gold-mining project in Skouries, Chalkidiki will be used to disconfirm the theoretical model. This disconfirmation along with new information obtained through

the interviews will allow me to build a new model, discover sustainable development's role in gold-mining sector and propose communication, environmental and socio-economic policies companies need to implement in order to promote sustainable development effectively and thus curb public resistance to their projects. This last part of my research refers to the second and third research questions I intend to give an answer to.

### 3. Methodology

#### *3.1 Why case study research?*

My decision to use a case study as a methodology in this thesis is based on various reasons. First of all, case study research has historically constituted a very useful tool in answering “how” and “why” questions from real-life contexts (Mills, Durepos, & Wiebe, 2010). Being able to answer to these “how” and “why” questions is a crucial part of my research as I am dealing with a complex real-life social issue, the gold-mining in Skouries, which involves many stakeholders and can cause different reactions (positive or negative). In particular, understanding “how” public support for gold-mining is shaped and “how” sustainable development can contribute to increasing this support are of major importance in my research. On the other hand, “why” refers to the reasons behind the failed attempts of mining companies in the area of Skouries to proceed with their gold-mining projects and the reasons that led these companies both in Skouries and globally to the formulation of sustainability-oriented policies. By using a case study approach, I aim at obtaining and exploring data collected in real-life environment that will eventually help me understand and explain the complexities of gold-mining which may not be captured through experimental or survey research. Furthermore, as a methodology, case study research involves considering multiple sources of evidence and enables the investigation of social mechanisms and social interactions (Mills, Durepos, & Wiebe, 2010). Finally, when it comes to the corporate point of view - which I decided to support with this thesis - case study research is more sensitive regarding the social, cultural, and economic contexts of an issue compared to quantitative research approaches (Mills, Durepos, & Wiebe, 2010).

#### *3.2 Why the case study of gold-mining in Skouries, Chalkidiki?*

The case study of gold-mining in Skouries, Chalkidiki, constitutes a great basis for my research because it will help me close the gap in current literature regarding the gold-mining sector in developed countries. As mentioned earlier, there has not been

paid enough attention by neither academics nor companies to the factors that drive local communities' behaviour towards gold-mining in developed countries and there has not been conducted an assessment of the contribution of sustainable development to influencing positively the society over mining, nor is there any thorough investigation over the policies mining companies can use in order to promote sustainable development to the local communities. The ore-rich area of Skouries, which is located in the north of a developed country, namely Greece, is of great interest for gold-mining companies attracting big investments over the last few years. The reason why I chose this specific area for my research is that in this region, conflicts were not only expressed in the form massive demonstrations, but they took a quite different turn with violent clashes between local communities, mine workers and the police. I believe this is something quite rare for a developed country where such social issues are normally dealt with discussion and compromise. The highlight of this tension was the arson attack at the company's construction site in Skouries on 17th of February 2013 where a part of company's mining equipment was destroyed (To Vima, 2013). What was even more interesting in this case, was that despite the gold-mining company getting actively involved in the development of the area, public support was something that it failed to achieve. This drew my attention because it gives me a good chance to delve into why society-oriented policies implemented by mining companies failed to yield any positive results. More specifically, between 2006-2013, Hellas Gold S.A., thee subsidiary of Eldorado Gold S.A., invested €13 mln for infrastructure projects like road construction, water supply network, biological cleanings in the broader area, while since 2012, it had been contributing €3 mln per year to the municipality of Aristotle in order to assist to covering needs of public utility (IOBE, 2016). Having made all these investments without succeeding to realize its gold-mining projects, Canada's Eldorado Gold, Greece's biggest foreign investor, announced on September 11 of 2017 that it will suspend its operations in the country as of September 22 of the same year (Hope, 2017). So, what interests me in this thesis is to identify what shaped the behaviour of local communities in Skouries towards Hellas Gold's gold-mining project, see why the situation there took a violent turn, identify any steps made by the company regarding sustainable development and if it did make such steps, why its contributions to the society did not yield any positive impact on local communities' perception of gold-mining activities in the area.

However, the mining history of the broader gold-rich area of Chalkidiki is quite long and it does not begin with Skouries, but instead, it dates back in the 80's with METVA, a subsidiary of the Greek government-held company ETVA, which attempted to open a gold mine initially in Olympiada (Mpamiatzis, 2013). Soon, the project was met with strong public resistance and ended up in total failure (Mpamiatzis, 2013; Kadoglou, 2014). Later on, after two failed public tenders in 1995, TVX, a Canadian company decided in 1996 to take on the situation and attempted once again to open gold mines in Olympiada (Mpamiatzis, 2013). The local municipality back then approached the Council of State over the initiation of gold-mining activities which finally justified the municipality's appeal, with the following reasoning: *"The damage from the whole process will be greater than any expected profit"*. The decision was published in 2003 and after this development, TVX went bankrupt with its 480 workers being left without a job (Mpamiatzis, 2013). In 2004, TVX was bought in by "Hellas Gold" for €11mln and in 2006 a single business plan for the parallel development and exploitation of the gold deposits of Olympiada and Skouries this time, is submitted (Mpamiatzis, 2013). A few years later, in August 2010, "Hellas Gold" proceeded with the submission of Environmental Impact Assessment (EIA) to the Ministry of Environment and Climate Change, requesting approval for the investment in the mines of Skouries and Olympiada (Mpamiatzis, 2013). In February 2012, the technical studies of the sub-projects "Mining Facilities of Skouries" and "Mining Facilities of Olympiada" both being part of the greater project "Mining-Metallurgical Installations of Cassandra Mines" were approved by the Ministry of Environment and Climate Change (Mpamiatzis, 2013) but the actual gold-mining in Skouries has not started as of today due to public uproar. This historical background reveals the long struggle between local communities and mining companies regarding the realization of gold-mining activities in the broader Chalkidiki area and in Skouries in particular. Despite the support over time by previous governments for gold-mining projects in the area, locals have always managed to stop any attempt to proceed further with the realization of gold-mining projects.

The clashes between locals, police, and the company were focused primarily on issues related to woodcutting, tailings deposition, and in particular the risk of the release of toxic substances like arsenic to the environment during the ore processing for gold (IOBE, 2016). The metal mixture in Skouries is extremely rough, as the arsenopyrite

concentrate contains 11% arsenic, which makes metal decomposition extremely dangerous both for the environment and for human health (To Kouti Tis Pandoras, 2017). The proposed method for recovering gold from arsenopyrite was that of cyanide, a method which was rejected in 2002 by the Council of State as extremely dangerous (To Kouti Tis Pandoras, 2017). Also, in terms of the investment plan, a total of 4,500 acres of old-growth forest on mountain Kakavos were expected to be cut (To Kouti Tis Pandoras, 2017). Gold mining activities in Skouries area were expected to last for 27 years (Proto Thema, 2017).

So, as mentioned earlier, out of this case study research, I expect to identify the factors that shaped the stance of local communities towards gold-mining in the Skouries area, investigate what steps the company took with regards to sustainable development and assess the role of sustainable development in influencing positively local people's perception of gold-mining. Finally, I intend to propose socio-economic, communication and environmental policies for mining companies that will be sustainability-oriented, will take into account society's expectations and will help curbing public resistance.

### *3.3 Data collection methods*

My intention in this thesis is to have a qualitative rather than a quantitative model which will depict the factors that shape local communities's behaviour towards gold-mining in Skouries, Chalkidiki. Understanding the dynamics of this behaviour, assessing the impact of sustainable development on it and proposing sustainability- oriented policies for mining companies in order to facilitate the acceptance of their projects by the public, are all core components of my thesis. I believe that these components can be analyzed better with the use of System Dynamics and especially a qualitative model such as a Casual Loop Diagram (CLD).

*“Causal loop’ qualitative system dynamics enhances linear and ‘laundry list’ thinking by introducing circular causality and providing a medium by which people can externalise mental models and assumptions and enrich these by sharing them”*  
(Wolstenholme, 1999:424).

In other words, causal loop diagrams help us show underlying causal mechanisms of a situation to a broader audience. This decision of mine not to choose a quantitative model is based on the fact that the available quantitative data regarding the mining project in Skouries are quite contradictory between the NGOs, the locals and the gold-mining



company. These contradictions along with possible lack of data over certain parts of the mining project, may lead to speculative models, something that is not my intention in this thesis. Moreover, gold-mining is an issue which is not purely numerical, but it has social and cultural contexts as well. This is something difficult to assess with the use of quantitative models.

To date, interviews have been widely used to build system dynamics models (Andersen, et al., 2012). Interviews enable us to explore patterns of everyday life, the understandings, experiences and imaginings of the case-study research participants and the processes behind social processes and relationships (Edwards & Holland , 2013) . Achieving all these, will help me understand better the dynamics of the behaviour of local communities when it comes to gold-mining and evaluate the role of sustainable development in facilitating the materialization of gold-mining projects. These are both core components of my thesis. So, in this research I will primarily collect data using open semi-structured interviews with representatives of the warring parties in that specific area (Skouries). These warring parties are locals residents, company's employees that are also local residents, leading members of the largest local movements against gold-mining (i.e. Epitropi Agona Megalis Panagias & Syntonistiko Ierissou), an environmental NGO (Kallisto) that stands against the gold-mining project, the representative of Hellas Gold S.A which is the mining company "owning the project". My intention was to involve the administration of the municipality of Aristotle in the interviews but this was only possible using audio-visual material available online where interviews of current and ex-mayor of Aristotle were posted. I managed to gather my data based on a total of 9 interviews, 7 of them via Skype video calls and 2 of them were available online in audio-visual form and together they include representatives of all parties already mentioned. This decision of mine was based on the fact that I wanted to achieve an as much objective research outcome as possible that will take into account the interests and perspectives of all the parties involved in the gold-mining project. Representatives of the largest resistant movements are expected to provide me with information regarding the gold-mining activities that the company would likely abstain from revealing. Also, since the members of anti-mining movements are local residents too, they can provide me with an insight on the reasons that lead them and the society to this strong resistance, thus helping me eventually to understand their behavior. These leading members of anti-mining movements that have been involved in anti-mining

activities for a long time and have a strong knowledge of the mining history of the Chalkidiki area. Dyer, et al., 2008 claim that well informed individuals exercise substantial influence on the direction of a group. This I believe explains partially the fact that these movements have not changed their policy towards gold-mining in Skouries over the years nor do they plan to do so easily. The NGO will likely provide me with mainly environment-related concerns regarding the project in Skouries. The company's representative will explain company's point of view over the situation in Skouries and will likely reveal aspects of the project that have not been communicated well enough with the local population and movements. Interviews with locals working or living near gold-mining areas are expected to expose their needs, the reasons they decided to oppose gold-mining projects and will probably help me understand how their stance towards mining activities can change. Also, during these interviews, I will try to investigate the perception of sustainable development that each party has and identify its potential in promoting gold-mining projects. Furthermore, I plan to use reports regarding the gold-mining project in the Skouries area published by both the company and anti-mining parties like the Kallisto NGO.

The interviews were finally held via Skype and my intention was that with the consent of the participants, they would be recorded in audio form and would be used for academic purposes only. It was not necessary for this consent to be requested in written form as no participant had objections over the recording of the interview. The interviews lasted between 45'- 60' each. Participants were told about the research purposes and procedures, including the nature of their involvement in this research in advance. They were not pressured to take part in this research or any component of it and they were given the chance at any time, to withdraw themselves or the data they provided. Finally, participants were allowed to raise questions and concerns during and after the interviews, and for this purpose, they were provided with my contact information. The identity of the interviewees will not be revealed at any part of this thesis and the confidentiality of any sensitive information will be preserved.

#### 4. Results

The interview results revealed some interesting findings about the participants and their perception of a number of issues related to the gold-mining project in Skouries, Greece. These issues vary from the explanation of the phenomenon I investigate, i.e. gold-mining in Skouries, to the definition of the core element of my

research which is sustainable development. As expected, a number of factors that shape local communities' behaviour towards gold-mining identified in Skouries, differed from the ones deriving from current literature. Some factors like the “new values” or “resources available” were proved to be not valid at all in the Skouries case while others were a bit either modified like the “company’s high quality social contributions” or completely new like “fake news” factor. Regarding sustainability in gold-mining, local communities were very interested in seeing biological methods such as phyto-mining being adopted by mining companies. At the same time, they recognized the difficulty in implementing this kind of methods mainly because of the longer time this process takes to finally extract the gold.

The findings of the interviews will be analyzed systematically based on 13 loops from the theoretical model. My aim is to examine whether empirical reality disconfirms my theory expectations and if so, to what degree. This is why I chose these specific loops because they constitute a better basis to compare and identify major differences and common ground among some of the main factors shaping local communities' stance towards gold-mining in developing and in developed countries. Findings showed that only 4 out of 13 loops analyzed below are valid in both the Skouries case and developing countries without any modifications.

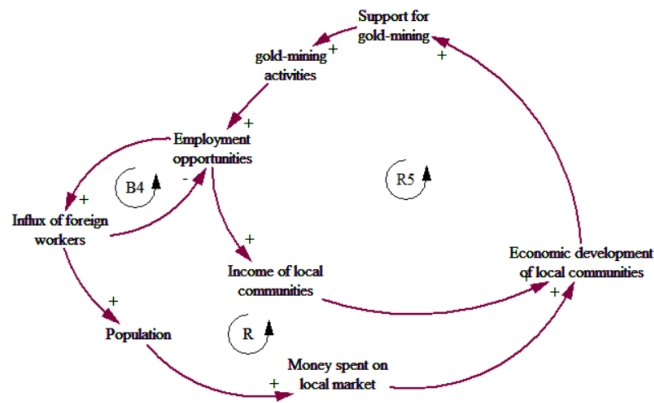
#### *4.1 Factors shaping local communities' behavior towards gold-mining activities in Skouries, Greece*

Having interviewed a number of participants representing various parties involved in the Skouries gold-mining project, I discovered that the factors shaping their behavior towards the project vary but are not completely different from those of the developing countries. More specifically, everybody agreed that gold-mining creates employment opportunities for the locals. These employment opportunities lead to an increase of the available income to the locals. However, this may not necessarily entail greater economic development of local communities, but it can incur some losses to the local market too.

*“People earn that much money (from mining) that they travel to Thessaloniki on the weekends and they do their shopping in big retailers and shops located there, thus affecting negatively the local market” (local resident).*

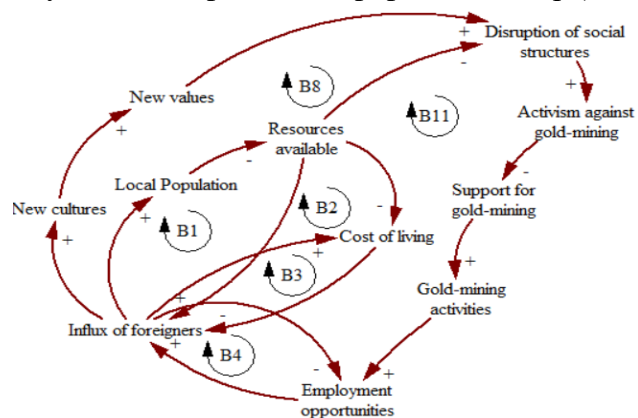
Of course, a big part of the income increase steaming from employment opportunities goes to the local market, helping it to perform better.

An increase of the local population is also an outcome of the investment that leads eventually to an increase in money spent on the local market and consequently affects positively people's opinion over the project. So, we see that the “local communities' income” loop (R5) and the “employment” loop (B4) are valid not only for the developing countries, but for the Skouries case as well. People did not appear to be concerned about the consequences of the influx of foreigners in the area as none of them mentioned fear for resources available, introduction of new cultures or social disruptions that usually follow such changes in developing countries. Instead, we have the creation of a new “population” loop (R).



*“One of the main advantages of this project for our village is the people that are coming. Our village is getting “manned” again, the market moves again, there are people in the shops, our square is full of people and that's why it has become a tourist attraction”, (company's environmentalist).*

Therefore, a number of previously created loops like the “population” loop (B1), the “support for gold-mining” loop (B11), the “resources” loop (B2) the “new cultures” loop (B8) and the “cost of living” loop (B3) are not valid in the Skouries case. Instead, we have the creation of a new “money spent on local market” loop (R'2).



As for the social contributions that gold-mining brings, participants acknowledged their existence but were divided about them. Those representing movements against gold-mining and the mayor were indifferent to any social

contributions of the company as they value human life and the natural habitat more. On the other hand, residents not belonging to any movement acknowledge that the company has contributed locally in various forms, such as: financing of local football teams and cultural clubs, fuel for police vehicles, cleaning products for the local medical center, construction of a large road, compost composition from tree branches and leaves gathered by the locals. However, lack of planning may hinder the development of the area despite these social contributions.

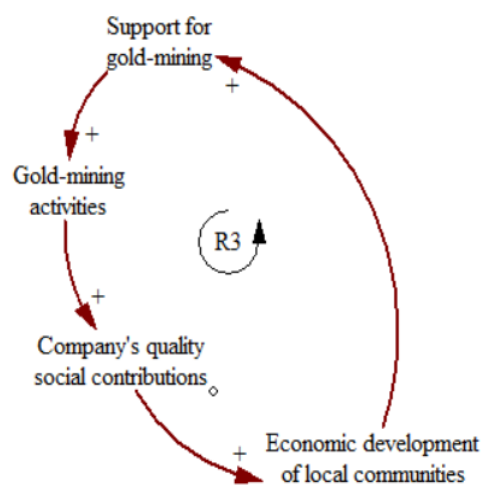
*“The road constructed with company’s help aimed at serving only company’s interests as in the part beyond Skouries, works have stopped”* (local resident).

*“The planning of the road was wrong and an exit of the village of Arnea was closed”* (company’s environmentalist).

As for the rest of social contributions, the company’s environmentalist-resident claimed that:

*“.... the locals do not allow the company to offer more assistance and local administrations do not accept any money offered by the company”* (company’s environmentalist).

This refusal to accept company’s social contributions was something acknowledged by anti-mining movements as well. On the other hand, there are also calls for the company to investigate better the real needs of the local communities. We see therefore that local communities value more the **quality of social contributions** rather than social contributions in general. This actually creates the need to rephrase the variable “company’s social contributions” in the “social contributions” loop (R3) and to replace it with “company’s quality social contributions”.



Other identified factors that shape local communities’ behavior in Skouries were fear, violence and criminalization. According to locals and anti-mining movements, fear works as both a source of reaction to any new unknown activity in the

area, but also as a restrictive factor when it has been preceded by violence and criminalization. More specifically, in the second case, the representatives of movements against gold-mining said:

*“After 2015, with the election of SYRIZA, aside from the violence that people suffered, they also started not being able to afford this fight anymore and many got back to their houses. Many were afraid that they would end up in jail”* (anti-mining movement).

According to anti-mining movements, this fear was attributed to the fact that:

*“... in the municipality of Aristotle, out of the 20,000 inhabitants, there have been about 500 locals arrested and prosecuted so far because of their participation in the protests and this caused constraint on the reaction of those being against the mining project”* (anti-mining movement).

Safety concerns were also raised by anti-mining movements over the death of a miner in 2016 which was confirmed by the company. Because of that, the company “undertook an initiative to increase the number of site safety inspections, identifying safety hazards in advance of potential incidents occurring” (Eldorado Gold SA, 2016).

Fear seems also to be connected with the lack of trust and corruption within the Greek legal and governmental bodies too. This time however, it does not come only regarding whether money generated by the gold-mining project will end up to the right places for the economic development of the area, but also about whether laws and agreements regarding the environmental obligations of the company will be upheld. A resident actually mentioned:

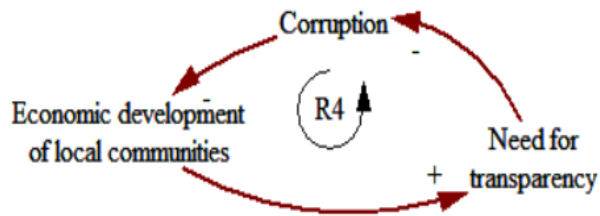
*“We may be considered to be a developed country, but with the municipalities and the governors in general, some things are just done under the table”* (local resident).

This feeling is amplified by the lack of transparency regarding the way licenses were given to the company and the real nature and extent of the project. A number of participants believe there has been no transparency about the real goals of the project.

*“In 2006, one of the geologists of the company told the locals of Megali Panagia that the Skouries plant would be a bit bigger than the Stratoni one, while in fact,*

*Stratoni processes 350,000 tons of ore per year and Skouries is expected to process 24,000 tons of ore a day, meaning at least 8 million tons a year” (anti-mining movement).*

Others believe there was not enough transparency over the negative impact of the gold-mining project on locals’ everyday life and the environment, with Kallisto NGO claiming for example that wrong data was used in the Environmental Assessment Study about protected animal species living in the area. What we notice here, is that the “transparency” loop (R4) is valid in the Skouries case too.



I also noticed that according to the interviewees, no actual consultations took place between the company and the local communities over the years. An anti-mining movement described consultations as “something that should be happening in developed countries”. Even those locals being in favor of the project, believe that the company should have invested more on communicating its goals to local communities:

*“Despite the efforts put forward by the company to open up to people by organizing excursions in the mining site, there was negligence from the company’s side in this sphere” (company’s environmentalist).*

Concerns were also raised regarding the proximity of inhabited areas to the gold mines. For example, the village of Megali Panagia is located only 3km away in straight line from the mining site. This makes the locals worry about the quality and quantity of drinking water, the destruction of the ancient forest located next to the village, and the local fauna and flora in general.

*“There will be dust in the air resulting from mining which will contain amianthus and quartz, both carcinogenic substances” (anti-mining movement).*

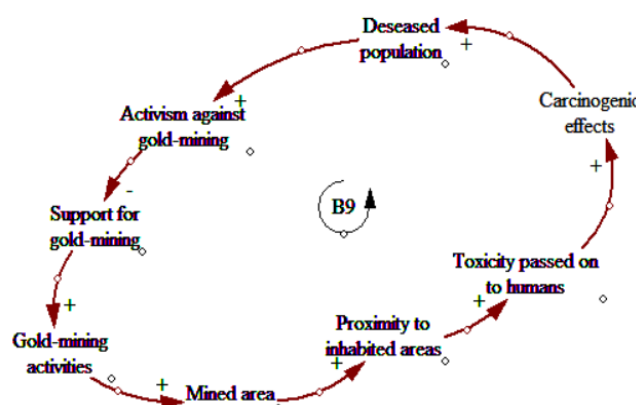
The concern over the water resources of the area was shared also by the mayor who said:

*“... the quality of water is affected by both its natural mineralization and the human intervention in the form of drilling” (mayor).*

Nevertheless, according to the company, water diversion channels are used to redirect surface water flows away from the site, with any groundwater entering the site being captured, stored, reused and/or evaporated (Eldorado Gold SA, 2016), thus it believes water resources of the area are not in danger. Also, two dams are going to be built and filled with toxic waste with the purpose of being finally covered by soil and then planted from above. About this, anti-mining movements claim:

*“The company did not take into account the fact that the area is seismogenic and it has suffered from earthquakes of more than 7 magnitude in the past”* (anti-mining movement).

Consequently, this puts in danger the existence of the villages should a dam breaks in case of a strong earthquake. So, we see that the “proximity to inhabited areas” loop (B9) is valid not only for the developing countries, but also for the developed ones.



The method of gold-mining and its potential impact on the environment and people’s life was of mayor importance for the participants. Everyone agreed that the method the company intends to use it that of “flash-melting”. However, the majority of the participants expressed concern over the friendliness of this method to the environment:

*“It has only been used on experimental level in plants in Finland”* (anti-mining movement).

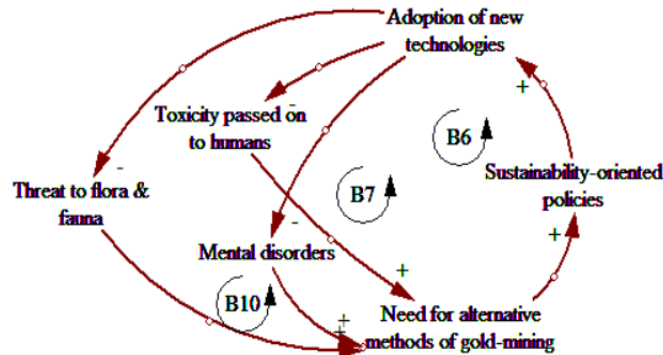
*“This method entails many dangers for the environment and the company does not define how these dangers will be avoided or dealt with in case something goes wrong”* (Kallisto NGO).

So, even though we have a new method that the company wants to implement, it seems that the parties involved are not convinced over its efficiency. Safety concerns regarding labor conditions in the mines were also mentioned by anti-mining movements, claiming that:



*“During the last 2 years, 3 people have been killed in the gold-mines” (anti-mining movement).*

We notice that the “mental disorders” loop (B6) is not valid in Skouries case as none of the interviewees mentioned mental disorders as one of their concerns. The other two loops (B7 & B10) are valid with the only exception being that local communities are not interested just in new mining technologies in general, but to those with proven efficiency and friendliness to the environment.



Movements against gold-mining coming from villages located at the seaside, expressed their belief that tourism is already affected negatively by gold-mining mainly because the area is classified as a “mining area”.

*“When people google Ierissos, the first results that appear on the search engine show the clashes where the police used chemicals against protesters” (anti-mining movement).*

The company is also aware of this concern of theirs and it is actively running programs aimed at promoting tourism in the area and for this purpose it claims it collaborates with foreign companies but also domestic public bodies like the Hellenic navy.

Furthermore, anti-mining movements claimed that gold-mining reduces other activities in the area like livestock, agriculture and small business ownership. It was made clear that their wish is not to halt every single mining project that may take place, but instead, to achieve a co-existence of different activities in the area. The mayor shares this view and believes Chalkidiki does not even need the gold-mines to develop. The previous mayor however, believed the investment is “crucial” for the development of the area.

Another factor affecting local communities’ behavior towards gold-mining in Skouries is the “mining education” among the locals because of the long mining history of Northern Greece. As a member of an anti-mining movement explains:

*“The father who worked in the mines was teaching his daughter to marry a miner and his son to become a miner. This was particularly intense in the mountainous villages and it was easier for these people to see the gold-mining project positively and consequently work there” (anti-mining movement).*

Another aspect of the mining history of the area affecting the stance of the local communities towards the Skouries project today, according to the company is the fact that since 1900 it was not common practice of the mining companies to rehabilitate the area once their activities were over. As a result, people do not trust company’s plans for the rehabilitation of the area.

Politics is something that everybody agreed was existent in the Skouries events. According to a member of an anti-mining movement:

*“... licenses were being given during elections periods so that people will not have the time to understand what is going on” (anti-mining movement).*

Also, in the pre-2015 phase, the then-government was in favor of the project with the then-prime minister declaring that the project should be materialized “at any cost”. This is where anti-mining movements and locals attribute the extensive use of chemicals and force by the police. On the other hand, other interviewees claim that opposition parties were behind this unrest. The company’s environmentalist who is also a resident said:

*“I have heard of stories that people travelled to the area and demonstrated in order to get 50 euros” (company’s environmentalist).*

So, we see that politicization of the project was another factor that led to violence and social division. The political struggle behind the Skouries project proves the complexity that major activities like gold-mining can receive in developed countries for the sake of achievement of political goals. This is a factor that has not been identified in current literature for gold-mining in developing countries, but seems to be present in developed ones like Greece.

#### ***4.2 Effect of Sustainable Development on changing locals’ stance towards gold-mining in Skouries***

Regarding sustainable development in gold-mining, the participants expressed a number of different opinions. Leading members of anti-mining movements believe that there can be no such thing as sustainable development because the damage gold-mining

causes to the environment is irreversible and the economic benefit of such projects goes to the companies instead of the society. More specifically, the representative of the anti-mining “Syntonistiko Ierissou” movement defined sustainable development as:

*“Stopping every (gold-mining) activity in Skouries and Olympiada, gradual restoration of the already caused environmental disaster in the area using the same workers and declassification of the area as a mining area so that other economic activities can emerge based on the carrying capacity of the area”* (anti-mining “Syntonistiko Ierissou” movement).

They were not able to provide me with any other definition of sustainable development. The two residents not belonging to any movement that I interviewed, did not give me an actual definition of sustainable development. However, one of them, even though she said she was not familiar with the term, she was not that far from the definitions provided for sustainable development by current literature when she was asked to define it:

*“I guess it is a development aimed at improving the way of living of the locals”* (local resident).

Another local described it as:

*“A development that will make the region a tourist attraction and will produce high quality products while a part of the mining area will remain contaminated and the rest will not be affected by the gold-mining activity”* (local resident).

So, there is generally lack of knowledge and understanding of sustainability among the parties involved in the gold-mining project. As mentioned earlier, sustainability calls for continuous environmental and socio-economic improvement (Hilson & Murck, 2000). So, being aware of sustainability is important I believe if the locals want to contribute to the introduction and selection of those policies aimed at this direction that are being proposed by the mining companies. What they agree about is that they all want a friendly-to-the-environment gold-mining method to be implemented and this is a part of sustainable development according to current literature. If such a method is implemented, then risks for human life and the environment get diminished. All of the participants are open to discuss such methods and see them positively. After I shortly explained them what sustainable development is about, they expressed their belief that

the company did not do enough towards that direction. They said that the company did not even have a proper plan for the post-mining phase of the project. For example, while the company says it will restore the mined area by planting trees both on the mining site and on the top of the dams full of toxic waste, locals said:

*“.... the company intends to plant oleanders instead of beech currently growing in the area”* (anti-mining movement).

In this way, local biodiversity is endangered. Preserving biodiversity is closely related to the protection of the environment and the organisms living within it. As explained earlier, the protection of the environment is one of the main concerns of locals and affects their stance towards gold-mining. We should not forget that the representatives of anti-mining movements are also locals. So, there should be a lot of caution when drawing a plan for the rehabilitation of the mined area once activities are over because restoring natural habitat matters a lot for all the parties involved in the project as their daily life is being unfolded around it.

As for the broader future development of the area in the post-mining phase, none of the participants is aware of any concrete plans of the company.

*“The company intends to make a development in the region that will focus on making it more touristic...but at present there is no specific kind of recovery to be implemented on the mined area”* (company’s environmentalist).

The same participant stressed out though that the company can do nothing on its own about the future development of the area as every decision about what policies to be implemented by the company need to be approved by the government. He also believes that it is on the society’s hands and responsibility to take advantage of the economic benefits that such investments bring to the locals. Another resident mentioned:

*“The company implements summer internship programs for students in order to help them in getting employed later on and it used to give its employees vouchers for meals and local products, but this has now been stopped”* (local resident).

The rest of the company’s contributions mentioned by the locals e.g. financing of football teams and cultural clubs, fuel for police cars etc are not strongly related to the long-term development of the area. Even the road built with the pressure of the

company does not reflect the needs of the locals according to them and was built mainly to facilitate company's activities. Locals believe the company did not work hard enough to identify and fulfill the real needs of the communities. If the real needs of local communities are not investigated in depth, then it is hard for the company to understand the dynamics of locals' stance towards gold-mining and identify the main points of leverage/intervention to shift the balance to its side.

When the participants were asked whether they are familiar with new sustainable ways of gold-mining like phyto-mining, their responses were negative. Nevertheless, all of them expressed their interest in learning more about such methods as they see them in a positive way. Participants said that they might reconsider their stance towards gold-mining if these sustainable methods are indeed friendly to the environment. They are open to new technologically advanced methods of gold-mining that will reduce the footprint on the environment and the dangers to human life. Nonetheless, all of the people interviewed were convinced that methods like phyto-mining require much longer time for the gold to be extracted and mining companies are not willing to do so. They believe that the companies will simply leave in case they have to implement a method that will take longer or will increase their operating costs.

#### *4.3 Communication, environmental and socio-economic policies to be implemented by mining companies aimed at promoting sustainability and increasing public support for their projects*

In this part of the interview, the participants were asked how the company should shape its communication, environmental and socio-economic policies in order to promote sustainable development effectively and eventually change their stance with regards to the project. This goal of mine comes from the fact that as we saw in the theoretical model and at the beginning of this chapter, the factors shaping local communities behavior towards gold-mining have socio-economic, environmental and communication roots. So, dealing with them properly requires creating the right policies aimed at this direction.

##### *4.3.1 Communication policies*

As for the communication part, Kallisto NGO said:

*“Such a planning (sustainable) begins with a substantial discussion and continuous consultation between the parties concerned” (Kallisto NGO).*

These parties according to Kallisto are: local administration, the company, representatives of farmers and stock breeders, beekeepers and tourism businesses owners. The interviewees were not satisfied from the quality and the way any communication efforts between them and the company took place in the past as not all of the previously mentioned parties were present. The company for its part said:

*“We conduct focus groups periodically with local stakeholders, we run quantitative research often and we have contacts with many Greek environmental NGOs”* (company’s representative).

Also, the movements against gold-mining in Skouries said that the company was “incapable” of giving answers to their questions. Even the company’s environmentalist said that during the early stages of the gold-mining project in Skouries, the committee appointed by the company was not prepared well enough to deal with “propaganda questions” put forward by the opposing parties. This lack of preparation from the company’s side he believes affected negatively public opinion over the company’s true intentions.

The term “propaganda” or “fake news” has been used by both the company and the anti-mining movements to describe the information spread from the other side. The company’s representative said that “fake news” is one of the biggest challenges they are facing. For example, the company’s representative used as an example photos published by a member of the current government who blamed the company in 2017 for the floods that took place in Stratoni, Chalkidiki in 2010. The company had not started any mining activities back then, so it refuted these allegations. Kallisto NGO believes there can be no sustainable development without “sincerity” from all the parties. Locals, anti-mining movements and the NGO expect from the company to be more open and communicate better the negative aspects of the project. A local said:

*“The company was presented as “too good to be true”* (local resident).

Moreover, it was mentioned that everything about the mines, was learned based on company’s published data with no one actually informing people formally.

*“Fortunately, company’s studies are published and accessible”* (anti-mining movement)

The company also mentioned this way of sharing information:

*“The information that we share with the locals is submitted to various state authorities, published online and especially many environmental parameters are published in real time” (company’s representative).*

Regarding the information spread by the opposed to gold-mining parties, the company said that many legal cases have been brought to the Greek High Court based on this “false” information, but the company has managed to win 17 cases covering all aspects of the investment in Chalkidiki. In an effort to increase transparency, as of 2016, all of Eldorado’s operating mines and construction projects have Environmental Management Systems certified to ISO 14001 (Eldorado Gold SA, 2016). According to Hellas Gold SA, in 2016, it also achieved full compliance with all the laws, regulations and licensing requirements while it was not imposed any fine by the Greek state regarding violation of agreements. This is a view that is not shared by the current Mayor of the Aristotle municipality who stated in a interview in 2017 that:

*“The company has been fined by the Greek state and environmental inspectors over 21 violations in 2013 and 2014 with the trials expected to take place soon” (current mayor).*

Furthermore, the company is blamed from anti-mining movements for switching to the use of cyanide for gold-extraction despite its initial claims of not using it while the ore in Skouries includes amianthus which is forbidden since the ‘90s. If true, then this could be a good reason for anti-mining parties to keep resisting to the project and the company needs to make every necessary step to prove its compliance with laws.

Other steps identified by the participants that would have helped the company to promote successfully its gold-mining project are an advertising campaign, a documentary informing people about what will happen in the area, conferences where academics will participate and information events.

*“The best way for the company to communicate its intentions is by doing things that are illustrated on locals’ daily life and not just saying words or publishing something on the internet or magazines” (local resident).*

In 2016, the company developed a publicly available environmental monitoring program to 320 different data points at its Chalkidiki assets in order to reinforce the availability and transparency of environmental data (Eldorado Gold SA, 2016). The

results of this program seem dubious though because none of the locals, anti-mining movement or the NGO mentioned it during the interviews.

The outcome of the interviews regarding the communication part of the project affects mainly the part of the theoretical model that contains variables such as: “support for gold-mining”, “activism against gold-mining” and “gold-mining activities”. These new variables have led to the creation of a number of new loops like the B6, B8 and R8 that are shown in the final model at the end of this chapter. Since these variables are affected, changes to the theoretical model will be made with new variables and presented into the final model at the end of this chapter.

#### 4.3.2 Socio-economic policies

As mentioned earlier, those representing movements against gold-mining were not really interested in any socio-economic policies implemented by the company as they value human life and the environment more and the only way to achieve this for them is by putting an end to the project. This is their priority. However, even they, agreed that what the company currently proposes has only short-term character and therefore they do not see any long-term prospects for the area to be developed that could make them reconsider their stance.

*“...the jobs created out of this project will last only for a couple of years until the project is over” (anti-mining movement).*

Therefore, they do not see this investment useful for the future of the area and they are interested in:

*“The development of sustainable agriculture and stock breeding, the use of biomass in energy and dropping oil as it is a felling area and the main combustion material is wood” (anti-mining movement).*

Locals were also worried about the co-existence of gold-mining with other activities in the area. For instance, preserving a strong tourism sector matters a lot especially for those living by the sea and the company claims it is actively engaged in offering help in this direction.

*“Hellas Gold is proud to be collaborating with the Mount Athos Association to promote Chalkidiki and attract tourists to the area while 18 new tourist attractions and activities have already been developed and the tourist season*



*has been extended from 40 days to almost three months, with local business revenues also rising” (company’s representative).*

Moreover, according to him, Hellas Gold S.A. also helps to increase diving tourism in Chalkidiki by supporting studies and research into shipwrecks in the area. For instance, in 2014, a survey commenced with the company’s support to identify historically important shipwrecks off the Chalkidiki coast, like the British steamship “Ermine,” which sank in 1917. Finally, a diving park is in the potential plans of the company as:

*“.... it would create new jobs, increase the number of tourists in the area, and generate new sources of income for the local community”, (company’s representative).*

*“A shipwreck museum has already attracted significant interest internationally” (company’s representative)*

However, it is noteworthy that none of the locals or anti-mining movements seemed to be aware of these plans of the company. Also, anti-mining movements are not interested in a massive form of tourism as it happens in the rest of the Chalkidiki area.

When it comes to more concrete steps from the company regarding the promotion of sustainability, opinions among the participants vary again. Some participants mentioned that they would like to see the company implementing more social responsibility programs. Such programs include vouchers for meals, support for local products, preference for locals to fill open mining-related job positions. Especially regarding the employment part, the company said:

*“87% of Hellas Gold employees are locals while 54% of the managerial positions (level of engineer and more senior) are covered by locals as well” (company’s representative)*

The company’s representative moved on to say:

*“... based on 2016 findings, Hellas Gold directly employs 24% of the workforce in the Municipality of Aristotle” (company’s representative).*

The company has also increased the training hours regarding safety, health and professional issues for its employees.

During the interviews, there were registered calls also for the company to develop programs aimed at promoting tourism in the actual gold-mines, making them effectively a touristic attraction. It was also proposed that:

*“The company should invite schools and show students the area in order to help them with their professional orientation since some of the students might become chemists, mineralogists or foresters”,* (local resident).

The company says it already collaborates with universities, schools, health providers and cultural associations in order to create “value” for the area, but they were not more specific. As for the transformation of the gold-mines into touristic attraction, the company’s representative expressed his thoughts of creating theaters on the mining site once activities are over, without this being company’s official position. The company has not specified the exact way the gold-mining area will be developed in the post-mining era.

Larger infrastructure projects would also be welcomed by the local communities provided they are built in order to improve their everyday life instead of solely servicing the company’s needs. Despite the fact that anti-mining movements expressed their indifference towards any socio-economic contributions from the company (except for the employment opportunities), when one of their representatives was asked about her stance towards contributions like the installation of wind turbines in the gold-mining area once gold-mining is over, she replied that:

*“I would not mind getting three wind turbines in my country, but getting 180 to export to Italy bothers me”* (anti-mining movement).

She, just like Kallisto NGO, believes that future development of the area should have “limits” and should be based on the “carrying capacity” of the area. The company says it materializes infrastructure projects like roads, water wells and power lines. However, locals mentioned that the road constructed next to Arnea village is the only big infrastructure project of the company and it was not even built in a way to meet their needs as one entrance to the village was closed.

Regarding the actual economic policies of the company, many participants acknowledged that the company still offers better salaries than the country’s average

with many benefits for the employees. However, the anti-mining movement of Megali Panagia expressed its disagreement about it, claiming that:

*“...with € 1100 gross for underground workers and € 586 for surface workers one does not solve any economic problem in the area”.*

Also, according to the anti-mining movements, the new Collective Labor Agreement between the company and the employees has not been signed yet and they (anti-mining movements) expect a downturn in the salary and the benefits that will be given to the employees under the new agreement.

Building socio-economic policies based on the suggestions and expectations of those resisting the gold-mining is crucial for eventually curbing this resistance. This was the goal of this part of the interviews. Of course, such important information like the one obtained at this stage, will also be incorporated into the final model, e.g. in loops R8, R3 and R1.

#### 4.3.3 Environmental policies

Participants want the company to use gold-mining methods that will respect the environment and human life. Everybody agreed they would like to see new technological methods to be implemented that will reduce the footprint of gold-mining. Even though the company's environmentalist expressed no concern regarding the impact of the project to the environment as he is satisfied with the company's planning, he said that sustainable development involves:

*“improved and new mining methods more environmentally friendly along with stricter measures taken by the government”* (company's environmentalist).

This call for newer methods in gold-mining sector is followed by people's interest in using methods with proven efficiency regarding their friendliness to the environment. For instance, as mentioned before, Syntonistiko Ierissoou and Epitropi Agona Megalis Panagias anti-mining movements along with Kallisto NGO expressed their concern regarding flash-melting:

*“Flash-melting method has only been used on experimental level in plants in Finland”*, (Kallisto NGO)

Locals do not have enough proof that this method is as good as the company claims. According to anti-mining movements and the current mayor, even the Court of State

warned the ministry of environment over the risks of this method. However, Hellas Gold SA refuted these claims saying that:

*“This method has been used in more than 70 plants around the world”*  
(company’s representative).

So, according to the company, it is not only a relatively new method of gold-extraction but also a tested one. In order to reduce surface footprint, the company decided to convert waste management at Skouries from thickened tailings to industry best-practice filtered tailings (Eldorado Gold SA, 2016). According to company’s 2016 report, in the same year, there was no recorded violation of environmental regulations and there was special focus pointed on the use of recycled water in its production with 100% of the water discarded being processed by water treatment units (Hellas Gold SA, 2016). Furthermore, the company currently performs parallel rehabilitation of the gold-mines, meaning that as the project expands over new points, the previously mined points are being restored. However, the company does not mention the detailed way of restoration e.g. the type of plants that will be planted.

In addition, locals, movements against gold-mining and the NGO are open to alternative sustainable ways of gold extraction like phyto-mining as long as its effectiveness is proven. What is important here is that none of them (company included) was aware of the existence of such methods.

*“If there is indeed such a plant like alfa-alfa, it is the first time I hear about it, I would be very happy to watch a documentary and then discuss it again”*, (anti-mining movement).

They all believed though that this particular method (phyto-mining) will probably take a long time to extract gold and that gold-mining companies would not wait that long. Syntonistiko Ierissou though, expressed its interest in seeing this method being used by the local communities themselves if it is indeed an environmentally correct method, so that the local communities will solely take advantage of it.

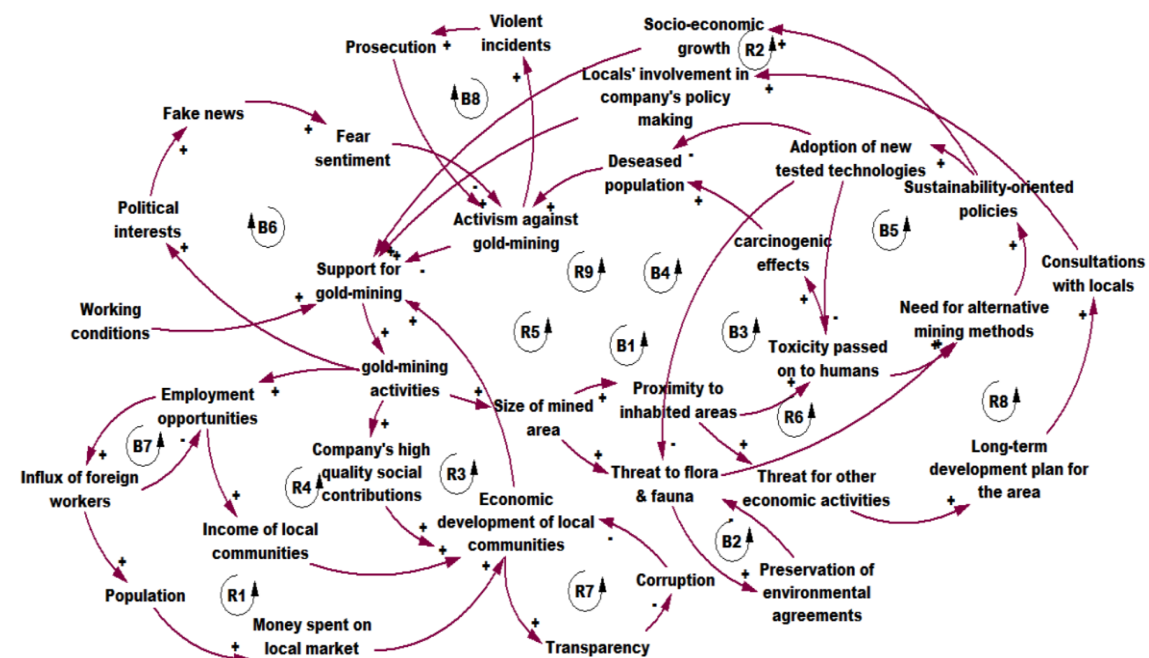
Finally, Kallisto NGO which specializes in environmental issues, stressed out the fact that the company’s scientific studies were not done correctly and included many faults, especially regarding the protected species living in the area, namely otter, wolf and jackal. For example, according to Kallisto’s 2011 study, based on interviews with

stock breeders, farmers and employees of the forestry authorities, the presence of jackal, otter and wolf in Eastern Chalkidiki and Skouries was confirmed (Petridou, 2011). In the same report, Kallisto says:

*“During the field work of the EIA, no mapping of the spreading and population status of the genus Canis that both jackal and wolf belong to took place”*  
(Kallisto NGO)

Moreover, while the EIA constantly refers to the importance of protecting fauna and flora, possible threats steaming from the project are not identified nor specific management measures were proposed for their protection (Petridou, 2011). Therefore, Kallisto would be interested in seeing the company shaping its environmental policies based on real scientific data that was obtained professionally.

So, regarding the environmental implications of the project, we see that both anti and pro-mining parties are very demanding when it comes to the protection of the environment as they seem to be quite attached to it. For this, environmental policies adopted by the company looks like they need to be in line with society’s demands in order to curb its resistance to gold-mining activities. The theoretical model will be modified accordingly, and the final model is presented below:



- Balancing Loops:

B1: The more the gold-mining activities, the bigger the size of the mined area and consequently the bigger the threat to local flora and fauna. When this threat grows, the importance of preserving environmental agreements grows too. If environmental agreements are preserved, toxicity passed on to humans drops and because of that, the need for alternative methods drops too. In case of shrinking need for alternative methods, sustainability-oriented policies shrink too. This shrinking leads to a drop in the adoption of new tested technologies, thus deceased population increases leading to more activism against gold-mining which in turn decreases support for gold-mining. Finally, when support for gold-mining falls, gold-mining activities fall too.

B2: The bigger the threat to local flora and fauna, the bigger the need to preserve the existing environmental agreements. When these agreements are preserved, the threat to flora and fauna drops.

B3: The higher the threat to flora and fauna, the higher the need for alternative methods of gold-mining. When this need rises, more sustainability-oriented policies will be introduced. These policies bring more new technologies and finally threat to flora and fauna gets diminished.

B4: Gold-mining activities cause mined area to increase and therefore the proximity of gold-mining to inhabited areas increases as well. This causes an increase in the-toxicity passed on to humans which in turn will increase the carcinogenic effects and will result to higher levels of deceased population. The higher the levels of deceased population, the higher the activism against gold-mining and the less support for gold-mining. Eventually, gold mining activities will drop.

B5: The higher the need for alternative mining methods, the more the sustainability-oriented policies implemented by the company and the higher the adoption of new tested technologies. When new tested technologies implemented increase, toxicity passed on to humans decreases and the need for alternative mining methods falls.

B6: The more gold-mining activities take place, the higher the political interest they attract. The higher the political interest, the more the fake news spread among local communities. When more fake news spread around, fear sentiment within local communities is amplified causing more activism against gold-mining. In this way, support for gold-mining drops and less gold-mining activities will take place in the area.

B7: The higher the influx of foreign workers the less the employment opportunities available. When employment opportunities drop, the influx of foreign workers will drop as well.

B8: The more intense the activism against gold-mining, the higher the number of violent incidents. When violent incidents increase, prosecution increases too. This increased prosecution

- Reinforcing Loops:

R1: When gold-mining activities increase, more employment opportunities are created, leading this way to an increased influx of foreign workforce to the area. If more foreigners flock to the area, the population grows. With larger population, the money spent on local market rise and the economic development of

local communities is amplified. With higher economic development of local communities, more support for gold-mining activities is achieved and finally more gold-mining activities will take place.

R2: The more the gold-mining activities, the larger of mined area, which in turn increases the proximity to inhabited areas. When the proximity is high, toxicity passed on to humans gets higher, thus leading to an increase of the need for alternative methods in gold-mining. When this need is high, more sustainability-oriented policies will be implemented, and socio-economic growth will be reinforced. Higher socio-economic growth leads to higher support for gold-mining and finally to more gold-mining activities.

R3: The more the gold-mining activities, the more the company's high-quality social contributions to locals and the higher the economic development of local communities. When economic development of local communities rises, the need for gold-mining activities rises as well.

R4: More gold-mining activities means more employment opportunities and thus higher income of local communities. When the income of local communities rises, the economic development of local communities follows the same trend leading eventually to more gold-mining activities.

R5: The more the gold-mining activities, the bigger the size of mined area gets, which in turn increases the proximity to inhabited areas. When the proximity is high, the toxicity passed on to humans is higher, thus leading to an increase of the need for alternative methods in gold-mining. When this need is high, more sustainability-oriented policies will be implemented, causing an increase in the adoption of new technologies. The more new technologies are used, the less the deceased population and consequently the less activism against gold-mining. Less activism means more support for gold-mining and eventually more gold-mining activities will occur.

R6: When gold-mining activities rise, so does the size of the mined area. This increases the threat that gold-mining poses for flora and fauna and therefore the need for alternative methods of gold-mining rises. When this need grows, it brings more sustainability-oriented policies, thus leading to the achievement of higher levels of socio-economic growth. With more socio-economic growth, support for gold-mining rises and more gold-mining activities will take place.

R7: Economic development of local communities requires higher transparency. Higher transparency reduces chances of corruption. When corruption is low, economic development grows.

R8: The more the gold-mining activities, the bigger the size of the mined area and consequently the bigger its proximity to inhabited areas. When proximity to inhabited areas increases, other economic activities in the area are threatened. The bigger the threat is, the bigger the need for long-term development plan for the area. As this need increases, it becomes more necessary for the company to have consultations with locals. The more the consultations are, the higher the involvement of locals to company's policy making which will lead eventually to greater support for gold-mining activities. When support for gold-mining increases, an increase in gold-mining activities follows and mined area grows again.

R9: When gold-mining activities rise, so does the size of the mined area. This increases the threat that gold-mining poses for flora and fauna and therefore the need for alternative methods of gold-mining rises. When this need grows, it more sustainability-oriented policies, thus leading to the adoption of new technologies. The introduction of new technologies will decrease the deceased population and will reduce activism against gold-mining activities. With less activism against gold-mining, more gold-mining activities will take place.

## 5. Conclusions

This thesis was aims at giving an answer to the following questions:

1. What are the factors that shape local communities' behavior towards gold-mining activities in Skouries?
2. What is the potential effect of sustainable development on influencing people's perception of gold-mining projects in Skouries?
3. What communication, environmental and socio-economic policies of mining companies have the potential to promote successfully sustainable development and eventually curb public resistance to gold-mining in Skouries?

The already existent literature has been mainly focused on the developing countries, so this research seeks to contribute to current literature with new knowledge and constitute the basis for further research on the topic investigated. Findings indicate that when the Skouries case is compared to the situation in developing countries, here we witness a higher degree of complexity of the gold-mining issue mainly because society's expectations from the mining company are higher and there has been politicization of the project.

The main factors that shape local communities' behavior towards the gold-mining project in Skouries are: employment opportunities, company's high-quality social contributions, size of mined area, proximity to inhabited areas, economic development of local communities, political interests, fake news, violent incidents, threat to fauna & flora, sustainability-oriented policies, consultations with locals and local's involvement in company's policy making. A major difference between the factors shaping local communities' behavior towards gold-mining in Skouries and in developing countries, is that in the first case local communities do not see negatively the influx of foreigner workers in their communities, nor do they worry about newly imported values and cultures. This difference I believe is attributed to the fact that



people in Skouries and in developed countries in general are more accustomed to living within a multicultural environment. The rise of cost of living, the sharing of resources and the disruption of social structures do not seem to be of mayor concern either. Locals of Skouries are rather interested in high quality social contributions from the company's side. On the other hand, the high volume of prosecution of those protesting the project - which I believe was quite impressive for a developed country - along with corruption risk constrain locals' positiveness towards the Skouries gold-mining project. Unlike residents of developing countries that care mostly about earning some money out of gold-mining or the availability of wild animals in the area as their diet is often based exclusively on them, Skouries locals seem to be more worried about the preservation of their quality of living. More specifically, this concern was expressed regarding the deforestation of the ancient forest lying in the area which is well known for its beauty, the water resources quality and quantity, the protection of endangered species residing there and the proximity of gold-mining to residential areas. The gold-mining method proved to be a major factor shaping local communities' stance towards the Skouries gold-mining project as despite the company's reassurances regarding its friendliness to the environment, locals claim it has never been tested outside of plants and do not trust it. Also, locals here are very interested in the parallel development of other activities in the area which is something new as well. However, what makes things very complex in this case is the political character this issue took. All the research participants claimed that political motivations influenced the materialization of the project and led to escalations, social division and unrest. For example, before 2015 that general elections took place in Greece, the then-opposition political party promised locals of Skouries it would stop mining activities and strongly supported anti-mining activism with many of its parliamentary members participating in anti-mining demonstrations. In this way, the opposition took advantage of the situation as the then-government that was in favor of the project and the Skouries locals, anti-mining movements and people against-mining from all over the country supported that party and eventually brought it to power in 2015. However, gold-mining activities did not stop until 2017 and anti-mining movements believed they have been "betrayed".

Regarding the second research question which refers to the potential effect of sustainable development on influencing people's perception of the gold-mining project in Skouries, despite some participants' negativity and ignorance about it, I believe it

can play a significant role in influencing positively locals' stance towards gold-mining if implemented. For example, the big interest locals, the NGO and local administration expressed in new ways of extracting gold that will greatly reduce its footprint on the environment, clearly is a step closer to sustainability. By minimizing a mine's environmental impacts throughout its lifecycle, from exploration, through extraction and refining, to reclamation, we contribute to sustainable development (Hilson & Murck, 2000). In addition to that, there were calls for the company to create a concrete restoration plan for the mined area that will be aimed at protecting biodiversity, promoting parallel development of other economic activities in the area and implementing social responsibility programs that will correspond to the current and future needs of the locals. All these calls have a long-term character and are elements of sustainable development. Since they were expressed by the opponents of the Skouries project, I believe that should the company decide to invest more on these calls, it would achieve better degree of acceptance for its project.

With regards to the third research question and the actual communication policies that the company could implement in order to promote effectively sustainable development, research findings indicate that more effort should have been put by Hellenic Gold S.A. on conducting substantial consultations with local communities. This was something all anti-mining parties suggested. Despite the company's claims that efforts have been made towards this direction, locals, local administration and the NGO believe that actually the opposite happened. Moreover, I believe the company has to be clear about its power to influence government because the fact that licenses are given during election periods raises concerns among the locals about transparency and does not help to shift locals' stance. Any surveys or data presented by the company should be collected and processed with the presence of locals, academics and NGOs in order to prove their validity. In particular, seeking shared value by creating partnerships with NGOs and conducting regular self-diagnostics are of great significance in order to promote sustainability (Skoldeberg et al., 2013). Furthermore, information related to the project should not be just uploaded on the company's website but also to be communicated to local communities with open consultations, conferences, advertising campaigns, information events and of course with the presence of academics. On the other hand, the fact that the company presents the whole project as a very well planned one with very low chances of something going wrong while at the same time Hellenic

Gold SA has been imposed with a number of fines so far and a worker died in the Chalkidiki mines, puts people's trust at risk making them negative to the project. Even though the company has won a number of legal actions launched by locals against it, it has not been open enough regarding the negative aspects of this project according to the interview participants. People in developed countries like Greece, have greater access to information and academic consultation, making them more aware of dangers that such projects bring, so sincerity and openness from the company's side is highly recommended. Developing countries instead, have not invested enough in access to information (Odutola, 2003). During the interviews I discovered also the issue of "fake news" or "propaganda" that seems to be a major concern for all parties. This term was used by both pro-mining and anti-mining interviewees in order to describe information spread by the opposite party. The company believes "fake news" influenced negatively public opinion over its project as untrue information regarding the company and the project was spread among the locals. Therefore, its policies should have a focus on building those mechanisms necessary to fight back "fake news".

About the socio-economic policies of the company that have the potential to promote sustainable development and thus curb local's resistance to its gold-mining activities, these need to be planned based on the long-term development of the area and its carrying capacity. This long-term development is mainly connected to the parallel development of other activities, the declassification of Skouries as a mining area and the implementation of social responsibility programs aimed at solving core issues of the locals. Towards this direction, I believe the company should organize seminars and educational programs aimed at both reinforcing locals' knowledge (breed stockers, farmers, beekeepers etc) over the activity they perform but also providing them with knowledge regarding new activities that could grow in the area. Funds and specialists could be also allocated by the company for this purpose. In the same way, professional orientation seminars for students, scholarships and even consultancy services to locals starting new businesses during or once gold-mining is over, I believe are very important. However, the company claims it has already contributed to the touristic growth of the area with various programs, but not a single one was mentioned by the participants. So, probably, the issue of communication of its policies appears again. Moreover, company's workers seem to earn the minimum salary and even that is endangered because of the new Employment Collective Agreement that has not been

signed yet. This is a topic that needs to be resolved urgently. Investing on larger high-quality infrastructure projects that will correspond to locals' real needs and make their lives easier, such the construction of big highways, rails, schools, medical centers, wind-power turbines etc proved to be important for the interviewees and show the direction the mining company needs to follow in its policy-making process. Economic support to the inhabitants of Megali Panagia - a village located just 3km away from the gold-mines - for voluntary relocation is recommended in order to ease tensions.

The environmental policies are also a part of my third research question and in order to be successful in promoting sustainable development and curbing locals' resistance to the gold-mining project of Skouries, they need to consist of new and tested in real-life conditions technologies that will reduce the footprint of gold-mining to the environment. Participants showed great interest in biological methods of gold-extraction like phyto-mining even though they were worried it could lead gold-mining companies abandoning their projects because of the longer time it takes to extract gold using these methods. Furthermore, the company needs to conduct a detailed research regarding the status of endangered animal species residing in the area in collaboration with NGOs and come up with certain measures to protect them and help to increase their population whereas necessary. Finally, it is important for the company to restore the flora of the area to its previous form, meaning that the already existing types of plants need to be re-introduced once gold-mining is over. In this way, biodiversity is not threatened and sustainability is achieved.

Having now answered all of my research questions, I would highly recommend that the mining company come up with a concrete post-mining plan or scenarios that will be created out of real-life data. These scenarios should then be communicated not only to local communities, but to its own employees too. What I discovered during the interview with company's environmentalist was that despite the fact that the company says it is sustainability-related, the environmentalist working for the company could not give me a proper definition of sustainable development nor was he aware of any concrete plans about the post-mining phase, he just gave me some ideas or proposals he has heard of. I believe that when local employees working in the mines are well informed about the project and the post-mining plan, then they can become the best "ambassadors" of the company to local communities. This is something Skoldeberg et al., (2013) agree on and they believe it can be achieved best when information access

and powerful communications platforms are effective within mining companies. I am convinced that coming up with a concrete post-mining plan will make clear how the company intends to restore the mined area or develop it once gold-mining activities are over and this in turn will reduce uncertainty among local communities and put an end on the spread of “fake” information that creates tensions and fear. Also, I am confident that building closer relationship with cultural and religious bodies is very important for companies operating in countries like Greece. Religiousness there is quite high within the society and this could be an extra reason for the locals to trust the company and its intentions.

## 6. Discussion

The findings of this research, even though they represent the Greek society, could constitute a guide for gold-mining companies deciding to invest on developed countries in general. As mentioned earlier, this research proves that there are a few differences among the factors shaping local communities’ behavior towards gold-mining between developing countries and a developed one (Greece). Hilson & Murck (2000) claim that in mine management, it is wrong using the environmental legislation as guidance because sustainability calls for proactive environmental management. This I believe applies mostly to developed countries where environmental legislation is already in place because in developing ones, very often such legislation is not even existent. This view of mine is supported by Hilson & Murck (2000) too, as they claim that in developing countries environmental laws are still in their infancy, and accompanying enforcement programs are far from effective (Hilson & Murck, 2000). Other differences refer to the higher expectations residents of developed countries have regarding the mining companies’ policies and the greater interest of the locals in sustainable development. These differences though, I am convinced are common among developed countries as all of them enjoy higher standards of living and are not willing to give up on them easily. Normally, standards of living in developed countries are much higher than in developing ones with more job opportunities and better salaries. This makes residents close to mining areas more demanding and not so keen into just receiving some financial compensation out of their involvement (e.g. employment) in a project because they can usually choose to perform a different job or activity. Moreover, it is a fact that residents of developed countries -just like in the Skouries case- have greater access to information, educational and scientific resources in order to shape their

opinion over issues like gold-mining. These are just a few examples suggesting that there are not great differences between developed countries when it comes to how local communities' stance towards gold-mining is shaped. However, corruption factor can indeed vary, with some developed countries having higher corruption rates than others.

Sustainable development is a topic that keeps gaining more ground in developed countries in general and communities keep getting more familiar with it. For example, more educational programs based on sustainable development are being introduced to universities and governments decide to invest on large sustainability-oriented infrastructure projects. For example, the Dutch government plans to launch the largest offshore wind farms in the world (Garfield, 2018). Such actions clearly show the importance of sustainable development for our future and the fact that local communities can see it being materialized increases their understanding and support for it.

Regarding the actual sustainability-related policies gold-mining companies need to implement, I believe those should have a long-term character and because of the higher standards of living, it is a common phenomenon that people are interested in high quality of social contributions. When it comes to the actual communication part, I am confident that just like in Greece, local communities of developed countries are interested in participating more actively in policy making of both mining companies and the government as it gives them power and leads to transparency, thus reducing corruption rates and preserving their interests as a top priority. According to the Skoldeberg et al., (2013), the success of mining companies in promoting their sustainability-related efforts lies on the degree of knowing their audiences and the influencers within them. Kumah (2004) suggests that gold mining corporations need to establish strong relationships with local communities that host the mines because this will ease tension and promote confidence and trust. Social media use in both developed and developing countries is on the rise and platforms like Facebook, Twitter and Instagram can nowadays serve this goal of building strong relationships and trust as people can interact freely with the company. For instance, Mongolia's Oyu Tolgoi copper and gold mine has over 70,000 Facebook fans (Skoldeberg et al., 2013). Socio-economic conditions in developed countries require salaries high enough to at least make life affordable and since business and employment competition keep increasing at an impressive speed, companies are expected from their employees to invest on

educational and self-development programs for them. Ensuring that communities will have the necessary skills and resources to continue development programs after mine closure is very important for mining companies as it can facilitate public support for their projects (Rosenfeld Sweeting & Clark, 2000). This can be achieved for example by training workers in additional industrial areas so that they will find easily their place in the job market once mining activities are over (Rosenfeld Sweeting & Clark, 2000). In the gold-mining sector, I believe such initiatives should not be limited only to mining companies' employees but should expand to local communities too, as employees are normally members of local communities and whole families rely on the income from gold-mining. Again, this is something that was identified in the Skouries case and can be applied to other developed countries as well because in this way local communities will keep developing after mine closure and this is something I believe is welcomed in every country.

“Fake news” issue is a relatively new topic that has been subjected to criticism and is the main point of argument in various occasions around the world. This research has found that “fake news” had negative impact on gold-mining company's project in Skouries, as the misinformation spread influenced locals' perception over the project in a way that turned them against the company, giving it no other options but to suspend its activities in 2017. Of course, this does not mean that all the information that does not match the company's point of view is “fake news”. Instead, valid information could be a great input for the company's decision-making process as it may reveal potential dangers or flaws of the project. In modern world, one way that mining companies could successfully fight back “fake news” is via strong presence in social networks, as in this way companies can provide the public with constant updates and proof regarding their activities. Also, by being more transparent and letting locals, local administration and NGOs to have an impact on their policies and post-mining phase planning, mining companies can facilitate better flow of information as all stakeholders will have direct access to information related to their projects, thus reducing the chance of unfounded information or assumptions being spread. However, future researchers need to shed more light into how mining companies but also companies in their broader form can fight back “fake news” effectively and make sure their message and intentions are communicated correctly to their stakeholders.

Another interesting finding that requires extra research is the issue of using sustainable ways of gold-mining like phyto-mining by local communities themselves. Plants first recorded to synthesize gold nanoparticles were alfalfa seedlings and such methods are far more environmental friendly than other gold extraction methods like cyanidation (Curtis & Mousavi, 2014). Minimizing adverse environmental impacts is an important goal for all industries keen on contributing to sustainable development (Hilson & Murck, 2000). More specifically, in this research, we saw that the participants expressed their interest in biological methods of gold-mining but they questioned whether it is realistic for mining companies to invest on them because of the longer time it takes to extract gold using plants. Therefore, I consider it as a great idea the implementation of such methods to mining sites located close to inhabited areas not necessarily from the companies (since it is a long procedure and can increase their costs), but from local communities themselves. So far, mining activities have been performed exclusively by mining companies around the world that in many cases have not respected local communities and the environment, thus leaving behind them a destroyed natural habitat once they are gone. Consequently, what I propose is new and therefore it needs to be investigated in depth in order to see if it is indeed feasible and profitable along with how it can be initiated. For example, I believe that for this purpose, state funds could be allocated to provide local administrations/municipalities with specialists. educate and train individual locals that would be interested in this kind of investment, hold conferences and information events. Such biological methods, I am confident have the potential to increase revenues for both the state and local municipalities at first place, but also to create new employment opportunities for locals through an environmental-friendly way of doing business. In particular, if we take into account the huge ore resources that Greece is speculated to possess, such a sort of activity could create an economic boom for the country due to the high export price of gold. This of course, can be applied to other ore-rich developed countries as well, but as I already mentioned, its feasibility and profitability are yet to be investigated.



## References

- Andersen, D., Luna-Reyes, L., Diker, V., Black, L., Riche, E., & Andersen, D. (2012). The disconfirmatory interview as a strategy for the assessment of aystem dynamics models. *System Dynamics Review*, 255-275.
- Aswathanarayana, U. (2003). *Mineral resources management and the environment*. Lisse: A.A. Balkema Publishers.
- Butterman, W., & Amey, E. (2005). *Mineral Commodity Profiles—Gold*. Reston, VA, USA: U.S. Geological Survey.
- Carvalho, F. (2017). Mining industry and sustainable development: time for change. *Food and Energy Security*, 6, 61–77.
- Centeno, J., Tseng, C.-H., Van der Voet, G., & Finkelman, R. (2007). Global Impacts Of Geogenic Arsenic: A Medical Geology Research Case. *AMBIO: A Journal of the Human Environment*, 36, 78-81.
- CNN Greece. (2017, April 25). *In Chalkidi One of The Largest Ore Reserves in Europe*. Retrieved from CNN Greece: <http://www.cnn.gr/news/ellada/story/78098/sti-xalkidiki-ena-apo-ta-megalytera-koitasmata-orykton-stin-eyropi>
- Curtis, R., & Mousavi, A. (2014). Gold Mining: Is It Worth Its Weight? *Environmental Forensics*, 15(4), 293-295.
- Dyer, J., Ioannou, C., Morrell, L., Croft, D., Couzin, I., Waters, D., & Krause, J. (2008, February). Consensus decision making in human crowds. *Animal Behaviour*, 75(2), pp. 461-470.
- Edwards, R., & Holland, J. (2013). *What is qualitative interviewing?* London: Bloomsbury Publishing Plc .
- Eisler, R., & Wiemeyer, S. (2004, January). Cyanide Hazards to Plants and Animals from Gold Mining and Related Water Issues. *Reviews of environmental contamination and toxicology*(183), pp. 21-54.
- Eldorado Gold SA. (2016). *Focus on the future*. Vancouver: Eldorado Gold SA.
- Emmrich, O., & McGroarty, F. (2013). Should gold be included in institutional investment portfolios? *Applied Financial Economics*, 23(19), 1553-1565.
- Garfield, L. (2018, January 3). *The Dutch plan to build the world's biggest wind farm, complete with a large floating island*. Retrieved from Business Insider: <https://www.businessinsider.com/worlds-largest-wind-farm-netherlands-island-2018-1>
- Hellas Gold SA. (2016). *Report of Sustainable Development*. Athens: Hellas Gold SA.
- Herrera, R., Berger, U., von Ehrenstein, O., Díaz, I., Huber, S., Moraga Muñoz, D., & Radon, K. (2017). Estimating the Causal Impact of Proximity to Gold and

- Copper Mines on Respiratory Diseases in Chilean Children: An Application of Targeted Maximum Likelihood Estimation. *Environmental Research and Public Health*, 39, 1-15.
- Hilson, G. (2001). Putting theory into practice: How has the gold mining industry interpreted the concept of sustainable development? *Mineral Resources Engineering*, 10(4), 397-413.
- Hilson, G., & Murck, B. (2000). Sustainable development in the mining industry: clarifying the corporate perspective. *Resources Policy*, 26, 227-338.
- Hope, K. (2017, September 11). *Eldorado Gold to suspend operations in Greece*. Retrieved from The Financial Times: <https://www.ft.com/content/258f4871-e6fa-361a-a315-dd3965e15f79>
- Hustrulid, W., Mero, J., & Clark, G. (2017, April 25). *Mining*. Retrieved from Encyclopedia Britannica (EB) : <https://www.britannica.com/technology/mining>
- ICMM. (2012). *Our Work: Sustainable Development Framework*. London: International Council on Mining and Metals.
- IOBE. (2016). *The contribution of mining industry to the Greek economy*. Athens: FOUNDATION FOR ECONOMIC & INDUSTRIAL RESEARCH.
- Ivanova, G. (2014). The mining industry in Queensland, Australia: Some regional development issues. *Resources Policy*, 39, 101-114.
- Jain, R., Z. C. Cui, and J. K. Domen. 2016. Environmental impact of mining and mineral processing. *Elsevier*, Butterworth-Heinemann Publ., 322 pp
- Kadoglou, M. (2014, November 13). *30 years of fight against gold mines- A brief history*. Retrieved April 23, 2018, from Observatory of Mining Activities: <https://antigoldgr.org/blog/2014/11/13/30-hronia-agonas/>
- Kefalas, A. (2017, August 28). *Mining Industry: Harmonious Coexistence for Sustainable Development*. Retrieved from HUFFPOST: [https://www.huffingtonpost.gr/athanasios-kefalas/eksoryktikos-klados-armoniki-synyparksi-gia-viosimi-anaptyksi\\_b\\_17850470.html](https://www.huffingtonpost.gr/athanasios-kefalas/eksoryktikos-klados-armoniki-synyparksi-gia-viosimi-anaptyksi_b_17850470.html)
- Kesler, S. (2007). Mineral supply and demand into the 21st century. *US Geological Survey Circular*, 55-62.
- Kolonas, C. (2017, September 12). *Eldorado Gold: Truths and Lies with regards to the investment in Chalkidiki*. Retrieved from EURO2day: <http://www.euro2day.gr/news/economy/article/1565449/eldorado-gold-alhtheia-kai-psemata-gia-thn-ependys.html>
- Kuan, S., & Ghorbani, Y. (2016). A review of sustainable development in the Chilean mining sector: past, present and future. *International Journal of Mining, Reclamation and Environment*, 31(2), 137-165. Retrieved April 2018
- Kumah, A. (2004). Sustainability and gold mining in the developing world. *Journal of Cleaner Production*, 14, 315-323.

- Lockie, S., Rolfe, J., Miles, B., & Ivanova, G. (2007). Lessons from the social and economic impacts of the mining boom in the Bowen Basin 2004-2006. *Australasian Journal of Regional Studies*, 13(2), 134-153.
- Mills, A., Durepos, G., & Wiebe, E. (2010). *Encyclopedia of Case Study Research*. London: Sage Publications, Inc.
- Mpamiatzis, S. (2013, March 5). *The history of mines in Chalkidiki*. Retrieved April 23, 2018, from News 247: <http://www.news247.gr/reportaz/i-istoria-ton-metalleion-sti-chalkidiki.6196583.html>
- Mudd, G. (2007). Global trends in gold mining: Towards quantifying environmental and resource sustainability? *Resources Policy*, 32, 42-56.
- Newenham Kahindi, A. (2011). A Global Mining Corporation and Local Communities in the Lake Victoria Zone: The Case of Barrick Gold Multinational in Tanzania. *Journal of Business Ethics*, 253-282.
- Nowak, A., & Szamrej, J. (1990). From Private Attitude to Public Opinion: A Dynamic Theory of Social Impact. *Psychological Review*, 97(3), 362-376.
- Odutola, A. (2003, March 31). Developing Countries Must Invest in Access to Information for Health Improvements. *Journal of Medical Internet Research*, 5(1).
- Pearce, D., Dowling, K., Gerson, A., Sim, M., Sutton, S., Newville, M., . . . McOrist, G. (2010). Arsenic microdistribution and speciation in toenail clippings of children living in a historic gold mining area. *Science of the Total Environment*, 408, 2590-2599.
- Peisakhin, L., & Institute, J. (2012, February). Transparency and corruption: Evidence from India. *Journal of Law & Economics*, 55, pp. 129-149 .
- Petridou, M. (2011). *Kallisto's views on the EIA of the project "Mining and Metallurgical Installations of Cassandra Mines of Hellenic Gold SA". The jackal (canis aureus) and the wolf (canis lupus) in the study area*. Thessaloniki: Kallisto.
- Proto Thema. (2017, September 11). *Eldorado Gold is pulling out of Greece*. Retrieved from Proto Thema: <https://www.protothema.gr/economy/article/712385/feugei-i-eldorado-gold-apo-tin-ellada/>
- Rolfe, J., Gregg, D., Ivanova, G., Lawrence, R., & Rynne, D. (2011). The Economic Contribution of the Resources Sector by Regional Areas in Queensland. *Economic Analysis and Policy*, 41(1), 15-36.
- Rosenfeld Sweeting, A., & Clark, A. (2000). *Lightening the Lode: A Guide to Responsible Large-scale Mining*. Washington, DC: Conversation International.

- Sawkar, R. (2010). Gold Mining: A Development Authority in Karnataka. *Journal Geological Society of India*, 76, 208-214.
- Skoldeberg, J., Jones, V., Figueroa Kupcu, M., & Cable, C. (2013). *Changing the Game: Communications & Sustainability in the Mining Industry*. Brussels: ICM.
- Starke, L. (2002). *Breaking New Ground: Mining, Minerals and Sustainable Development*. London: Earthscan Publications Ltd.
- Swenson, J., Carter, C., Domec, J.-C., & Delgado, C. (2011). Gold Mining in the Peruvian Amazon: Global Prices, Deforestation, and Mercury Imports. *PLOS One*, 6(4), 1-7.
- Syrmatsis, D. (2017, August 23). *Record Year for Chalkidiki and Thasos: The first estimations for tourism in Northern Greece*. Retrieved from ThessNews: <http://www.thessnews.gr/article/48626/chronia-rekor-gia-chalkidiki-kai-thaso-i-proti-apotimisi-gia-ton-tourismo-tis-boreias-elladas>
- To Kouti Tis Pandoras. (2017, September 11). *This is how everything started in Skouries*. Retrieved from To Kouti Tis Pandoras: <http://www.koutipandoras.gr/article/etsi-ekinhsan-ola-stis-skoyries>
- To Vima. (2013, February 17). *Arson attack on gold mines in Skouries*. Retrieved from To Vima: <http://www.tovima.gr/society/article/?aid=498808>
- Tully, E., & Lucey, B. (2006). A power GARCH examination of the gold market. *Research in International Business and Finance*, 21, 316-325.
- Walser, G. (2000). *Economic impact of world mining*. Vienna: International Atomic Energy Agency.
- Wolstenholme, E. (1999). Qualitative vs Quantitative Modelling: The Evolving Balance. *The Journal of the Operational Research Society*, 50, pp. 422-428.
- World Business Council for Sustainable Development & Institute for Environment and Development. (2002). *Mining and Economic Sustainability: National Economies and Local Communities*. Geneva: WBCSD.
- World Commission on Environment and Development. (1987). *Our Common Future*. Oslo: WCED.
- World Gold Council. (2018, February 6). *Gold Demand Sectors*. Retrieved from World Gold Council: <https://www.gold.org/research/gold-demand-trends/gold-demand-trends-full-year-2017>
- World Wide Fund for Nature. (1991). *Caring for the Earth: A Strategy for Sustainable Living*. Gland: WWF.
- Young, J., & Septoff, A. (2002). *Digging for Change: Towards A Responsible Minerals Future. An NGO and Community*. Washington DC: Mineral Policy Centre.

Yu, J., Zhang, Z., & Zhou, Y. (2008). The sustainability of China's major mining cities. *Resources Policy*, 33, 12-22.

## Appendix 1 Interview questions

### **i. Introduction part & current situation**

1. What does you and/or your organization stand for when it comes to gold-mining?
2. In what ways have you been involved in the Skouries gold-mining issue?
3. What is the current situation in Skouries? Is there stability or conflicts keep taking place?
4. What is the current state of the gold-mines in the area?

### **ii. Current state of local communities**

5. What are the main sources of income for the locals in the area?
6. What are the main problems that local communities face?
7. In what ways do you believe that gold-mining projects could possibly contribute to dealing with these problems?
8. In what ways do you think gold-mining projects could increase these problems?
9. How do you justify the fact that many locals were in support of the investment?
10. What is the level of division among the local population over this topic today?

### **iii. Perception of gold-mining activities**

11. What are your main concerns when it comes to gold-mining in Skouries?
12. What are the main advantages of gold-mining in Skouries?
13. Are there any conditions under which you would reconsider your reaction towards gold-mining activities?
14. How do you explain the fact that other developed countries like Australia are leaders in gold-production and in Greece there is much resistance to this sort of investments?

### **iv. Skouries gold-mining project**

15. What do you believe was the driving force in turning the Skouries mining project into a violent situation where clashes took place on a daily basis?
16. What was your role in this escalation that took place?

17. What mishandlements do you believe were done by the company (if any)?  
How could they have been avoided?
18. What mishandlements do you believe were done by the NGOs (if any)? How  
could they have been avoided?
19. What mishandlements do you believe were done by the locals (if any)? How  
could they have been avoided?
20. What were local communities offered (e.g. relocation) in exchange in order to  
allow the initiation of gold-mines to take place?
21. What was the planning of the company regarding the post-mining  
development of the mined area?
22. How do you assess the level of transparency preserved by the company over  
its practices?
23. How do you assess the amount of information that was available to you over  
the negative impacts or the benefits of the investment?
24. Was there any communication line between you and the  
company/NGOs/local communities? If so, did you use it at full scale?
25. What actions were taken from your side (company) in order to meet local  
communities' demands or diminish their concerns?
26. What were the technologies that would be used to extract gold?

**v. Sustainable development**

27. How do you perceive sustainable development in the gold-mining industry?
28. How do you evaluate sustainable development's effect on reducing mining-  
related risks for humans?
29. What steps did the company take to promote sustainable development?
30. What is the potential of sustainable development to change your opinion over  
gold-mining projects?
31. How would like it to be shaped when it comes to social, environmental and  
economic sphere in the Skouries area?
32. How do you believe sustainable development could be best communicated to  
you from the company's side?
33. Are you aware of new biological methods like phytomining that can be used in  
gold-mining? Would you like to see the company implementing them?
34. Was sustainable development a core part of your planning for the  
materialization of the mining project in Skouries? If so,

- i. What environmental policies did you use?

- ii. What socio-economic policies did you use?
- iii. What communication policies did you use?



## Appendix 2 Other sources of information

<https://www.youtube.com/watch?v=MO8MarjcFts>

<https://www.youtube.com/watch?v=c9VNnayS-L4>