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**THE IMPACT OF ATTENTION TO SOCIOECONOMIC SUSTAINABILITY  
FACTORS ON THE OPERATIONAL CONTINUITY OF GOLD SURFACE-MINING  
PROJECTS: CASE STUDY ANALYSIS**

**TESIS PARA OPTAR AL GRADO DE MAGÍSTER EN MINERÍA**

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RESUMEN DE LA TESIS PARA OPTAR AL  
GRADO DE: Magíster en Minería  
POR: William Nabil Morocho Mondaví  
FECHA: 28/07/2017  
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THE OPERATIONAL CONTINUITY OF GOLD SURFACE-MINING PROJECTS: CASE  
STUDY ANALYSIS

Over the past decades, a clear link between mining activity and socioeconomic sustainability has been established, recognizing that there is responsibility in the mining industry to care properly for the upholding of the factors related to this kind of sustainability. However, the benefits for the mining industry itself by doing so have not been broadly highlighted.

This thesis aims at describing the effect of adequate attention to socioeconomic sustainability factors by a mining company, in the area surrounding its gold mining projects, on its own ability to maintain operational continuity. By using methodology designed for this study, it was found that the companies selected for analysis did take measures that resembled the Global Reporting Initiative Social and/or Environmental sustainability reporting guidelines, foresaw in or reacted to their implementation, and had different degrees of beneficial and adverse impact on the surrounding population and the environment, as perceived by the population itself.

The measures taken by the companies require expense in concrete socioeconomic sustainability areas such as local economy, infrastructure, health, education, etc., and that all companies had engaged in dialogue with the local community.

By observing the implementation and effects of the measures for sustainability, the reaction of the population, and the continuity of project operations, it was found that companies that created a timely and trusting atmosphere for dialogue and implemented measures within agreed timeframes, received positive perception from the local population and were able to maintain operational continuity.

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EL IMPACTO DE LA ATENCIÓN A LOS FACTORES SOCIOECONÓMICOS DE  
SUSTENTABILIDAD SOBRE LA CONTINUIDAD OPERACIONAL DE PROYECTOS  
MINEROS DE ORO A RAJO ABIERTO: ESTUDIO DE CASO

En las últimas décadas se ha establecido un claro nexo entre las actividades mineras y la sustentabilidad socioeconómica, reconociendo que existe responsabilidad en la industria minera de cuidar adecuadamente la mantención de los factores relacionados a este tipo de sustentabilidad. Sin embargo, los beneficios que se desprenden para la industria minera misma como resultado de ello no han sido ampliamente resaltados.

Esta tesis busca describir el efecto de una adecuada atención de una empresa minera a los factores de sustentabilidad socioeconómica en un área circundante a proyectos de extracción de oro sobre su capacidad para mantener continuidad operacional. Usando metodología diseñada para este estudio, se encontró que las compañías seleccionadas para análisis tomaron medidas que se asemejan a los parámetros del Global Reporting Initiative, dentro de los parámetros de reporte Sociales y Ambientales, previeron o reaccionaron en la implementación de tales medidas, y tuvieron diferentes grados de impacto beneficioso y adverso en la población y el medio ambiente del entorno, tal como se pudo haber percibido por la población misma.

Las medidas tomadas por las empresas demandaron gastos en áreas concretas de sustentabilidad socioeconómica tales como economía local, infraestructura, salud, educación, etc., y todas las empresas abordaron el diálogo comunitario de una u otra forma.

Al observar la forma de implementación y los efectos de las medidas de sustentabilidad, la reacción de la población, y la continuidad de operaciones, se encontró que las compañías que lograron crear a tiempo una atmósfera de confianza para el diálogo e implementaron las medidas dentro de los plazos acordados, recibieron una percepción positiva de la población local y pudieron mantener su continuidad operacional.

To the loving memory of my Grandparents

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# 1. INTRODUCTION

A brief overview of human history can show that its development has been closely related to the discovery and use of mineral resources; a key moment of such relationship can be seen during and after the industrial revolution. It is possible to find minerals and their derivatives in nearly everywhere human activities take place. The economy of many countries today depends on the income generated from mineral trading (*Roe and Samuel, 2007*). However, parallel to the uses and benefits streaming from mining (*Lange, 2006*), there are some clearly identified impacts on the socioeconomic and environmental sphere of human living conditions (*Franks, 2012*), both beneficial and detrimental to the general population's perception of wellbeing. With those ideas in mind, the concept of mining and sustainability, or *mining and sustainable development*, has emerged over the past decades (*Hodge, 2011*)

There are many approaches to defining the meaning of the term "sustainable development"; amongst the most prominent and widely known definitions is the one given by the Brundtland Commission (*Brundtland et al., 1987*) which states that "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". This definition could be seen as the basis for developing a better understanding of how the mining industry is capable of contributing to the sustainable development of an area surrounding its projects (*Lange, 2006; Roe and Samuel, 2007; Diestche, Stevens et al, 2007*) in areas such as local and national economy, infrastructure, education, etc., bearing in mind at the same time that the industry is also capable of producing changes, many of them permanent and irreversible, on local terrain morphology, flora and fauna, the economy and the population's general way of life (*Hodge, 2011; Owen and Kemp, 2013*). In view of this, many mining companies worldwide started to pay attention to sustainable development (*Kemp, Boele and Brereton, 2006*) into their broader project planning and development, and looking much closer at the stakeholders that are involved in any given project. Research has been done to understand the perspectives of these stakeholders (*Whittle, 2011; Owen and Kemp, 2012; Franks, 2012, Moffat and Zhang, 2013*), classified into three commonly accepted categories: the mining company, the government, and the population (*Minerals Council of Australia, 2016*)

Broadly speaking, a mining company's main interest in a mineral project is to participate in the minerals market, minimizing expense and maximizing return of investment, maintaining at all times operational continuity; this latter is a defining factor for project success especially between the stages of project feasibility and production (*Whittle, 2011*). From this perspective, a company will invest in projects that will generate revenue if the conditions generated by the government (*Franks, 2011*) and the local population allow for it (*Kemp and Owen, 2013*). In this context, the government is interested in having its mineral resources developed in such a way that they generate income for the State. For this, it provides a legal framework allowing mining companies to operate

(Lange, 2006). However, there are still questions as to the government's genuine interest in upholding sustainability as part of a comprehensive approach to mining legislation (Tiainen, 2016). For these two stakeholders it is quite simple to identify and quantify their expectations stemming from a mining projects.

Regarding expectations and responses of the third stakeholder, the local population surrounding a mining project, there are many ways in which they are expressed: from outright violent opposition to full collaboration with the mining companies (Webb, 2010; Owen and Kemp, 2012; South Australian Centre for Economic Studies, 2013; Nolen, 2014; Geens, 2017) Perhaps one of the main, and mostly unquantifiable, factors in understanding the local population's response has to do with the perception they develop around the actions and operations of a mining project and the perceived impact they have on their personal wellbeing and on their surrounding environment (Webb, 2010; de Waal and Ortocoma, 2011; Ololade and Annegarn, 2013) This makes the local population one of the most important stakeholders in a mining project and research has been developed about ways to properly engage in dialogue (Kemp and Owen, 2012, 2013; Buitrango, 2013; Moffat and Zhang, 2013)

So far, much of the research developed over the past decade has aimed at understanding the role of mining towards sustainability, basically showing the mining industry as inherently responsible in upholding the factors of socioeconomic sustainable development in the areas surrounding their projects, and the impact of the measures taken by companies for such purpose on the local population (Moffat and Zhang, 2013; Erzurumlu and Erzurumlu, 2014; Suopajärvi et al, 2015). However, there is still a lingering trend of thought in some mining companies that investment in sustainability is a waste of resources, and attention to sustainability comes only as an obligation that needs to be fulfilled.

The current perspective of mining and sustainable development, from a very simplistic viewpoint, places companies in the role of "givers" and the local populations as "receivers". However, there is not much research addressing the *inverse perspective*: what are the benefits for a mining company as a result of it adequately taking care of the socioeconomic factors of sustainability? In other words, how are the operations of a mining company served by the efforts it makes to uphold the sustainable development of the local population surrounding its projects? Finding some answer to these questions could contribute to evolve the discourse of mining and sustainable development to a stage in which both areas are seen as mutually benefiting, strategic, partners that gain from the success of a mining project.

## 2. SCOPE OF RESEARCH AND HYPOTHESIS

Since the range of possible answers to such questions can be very wide, because of the many types of minerals and mining methods used in projects world-wide, this paper explores them around gold mining projects, using open pit or surface extraction methods for ore-type formations, in projects that are somewhere between the stages of feasibility and production, where mining-induced changes occurred or can potentially occur (*Franks, 2012*)

This kind of mining was chosen not only because of the economic value of gold on industrial and artisanal goods, but also because of the direct impact it has on the long-term metal reserve backing for most of the world's economies (*World Gold Council, 2013*). From a point of view mineral of extraction systems, open pit methods generate the major volume of debris as well as many permanent changes to the morphological surroundings and to the lives of the population (*Franks, 2012*). Finally, from a project stage-development perspective, a gold mining company looks for steady project development between the time it becomes feasible and until the final stages of production; during that lapse it is vital for a company to have operational continuity in order to meet its production and financial targets to avoid project shutdown (*Whittle, 2011*)

Within such scope, this paper hypothesizes that one of the ways that mining companies are able to maintain operational continuity in their projects is when they take measures for addressing the socioeconomic factors of sustainable development of the areas surrounding their operations, and when such measures are perceived as beneficial by the population neighboring the project.

In this context, operational continuity is defined as the ability of a mining company to advance its operations, at any stage of its project development, without any external hindrance caused by the population of the territory surrounding the project.

In addition, sustainable development, or sustainability, of an area or territory is understood as the interaction of its social, economic, cultural and environmental aspects. As specified in the hypothesis, the focus of study centers round social and economic factors.

The role the government plays in maintaining operational continuity is not addressed in this study, as well as the legal tools and channels it offers the population to react to mining projects, because it opens an area of greater complexity that surpasses the scope and resources of this document. However limited it may be, this work intends to understand a more specific relationship between the population and a mining project, as described in the hypothesis.

Finally, this work addresses the position of the population towards a mining project from an angle perceptions rather than attitudes. In this work, it is understood that perceptions are the population's early reactions towards actions coming from the mining companies that eventually create attitudes towards a mining project. Thus, by developing this work from the standpoint of perceptions, it is intended to understand the importance of such early reactions.

### 3. METHODOLOGY

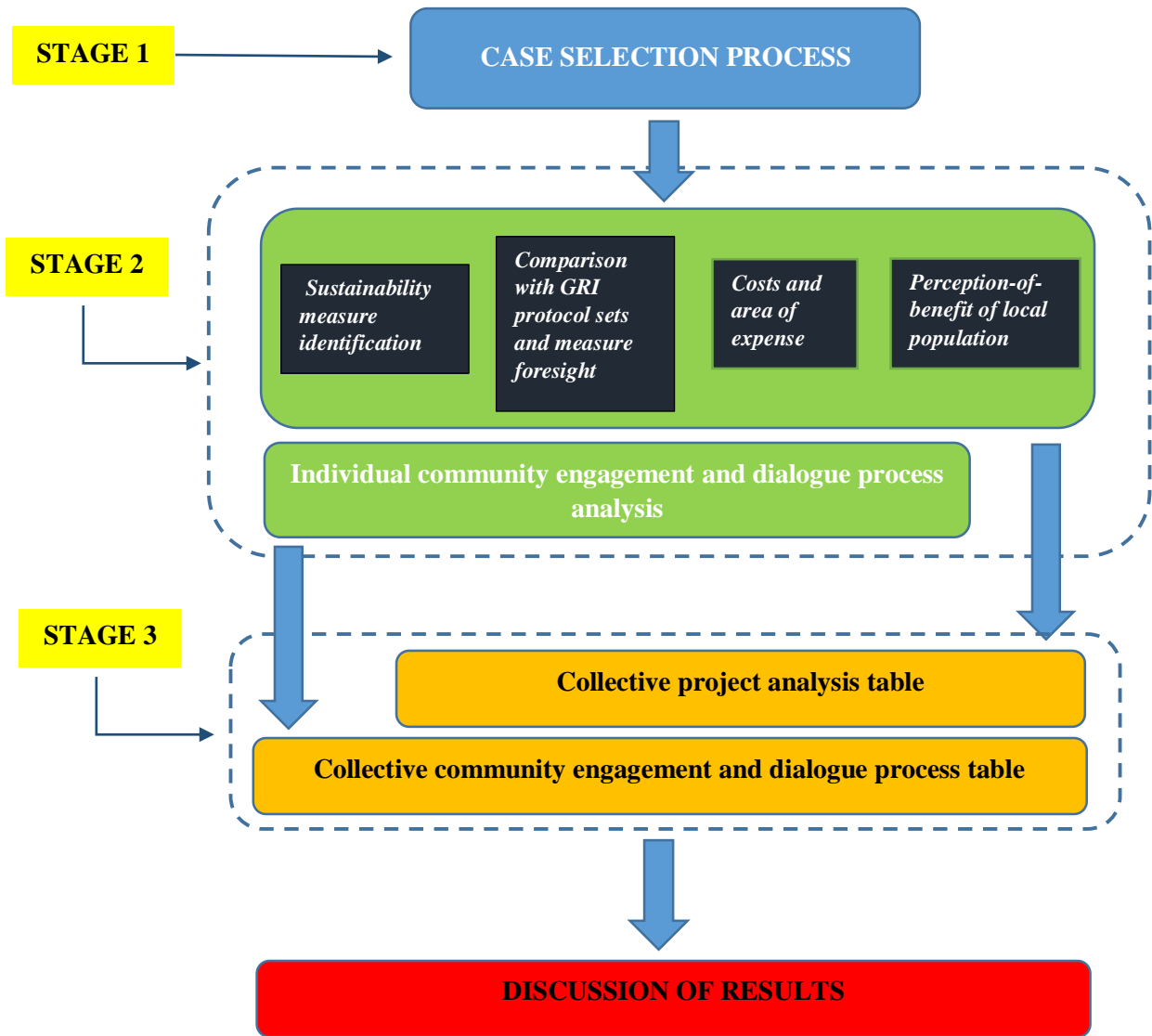
Based on the scope previously described, a three-stage research methodology was developed. This methodology is based on case-study meta-analysis.

The first stage started by selecting cases meeting the criteria of the research scope described above and checking if the company was able to maintain project operational continuity within the period described in each selected case-study or not.

The second stage studied some specific details of each individual project. For each one, it started by identifying and briefly describing the main sustainability measures taken by the mining company. Next, it checked if such measures resembled some kind of mainstream sustainability protocols, verifying if the measures were part of a foreseeable plan or merely reactive to circumstances. Afterwards it identified the amount of money spent on each measure and what area of local socioeconomic sustainability it addressed. It then moved on to determine the perception-of-benefit the local population had of the measures taken by the company on their own well-being and on the environment. Finally, it described the dialogue and community engagement process developed with the local population during the period described in each case study, and the reactions of the people to such process.

The third stage involved a collective analysis process, in which the information developed from each individual project was then gathered in one summary table, in order to compare individual results and look for similarities, trends, patterns, etc. This collective analysis table was made of similar parameters from the individual project analysis stage, using average and percentage calculations to summarize the overall information obtained from each case. This stage also involved collectively analyzing the dialogue and community engagement process. This third and final stage served as the basis for result interpretation and discussion.

The specific details of each stage of the methodology, as shown in Figure 1, are described in detail as follows.

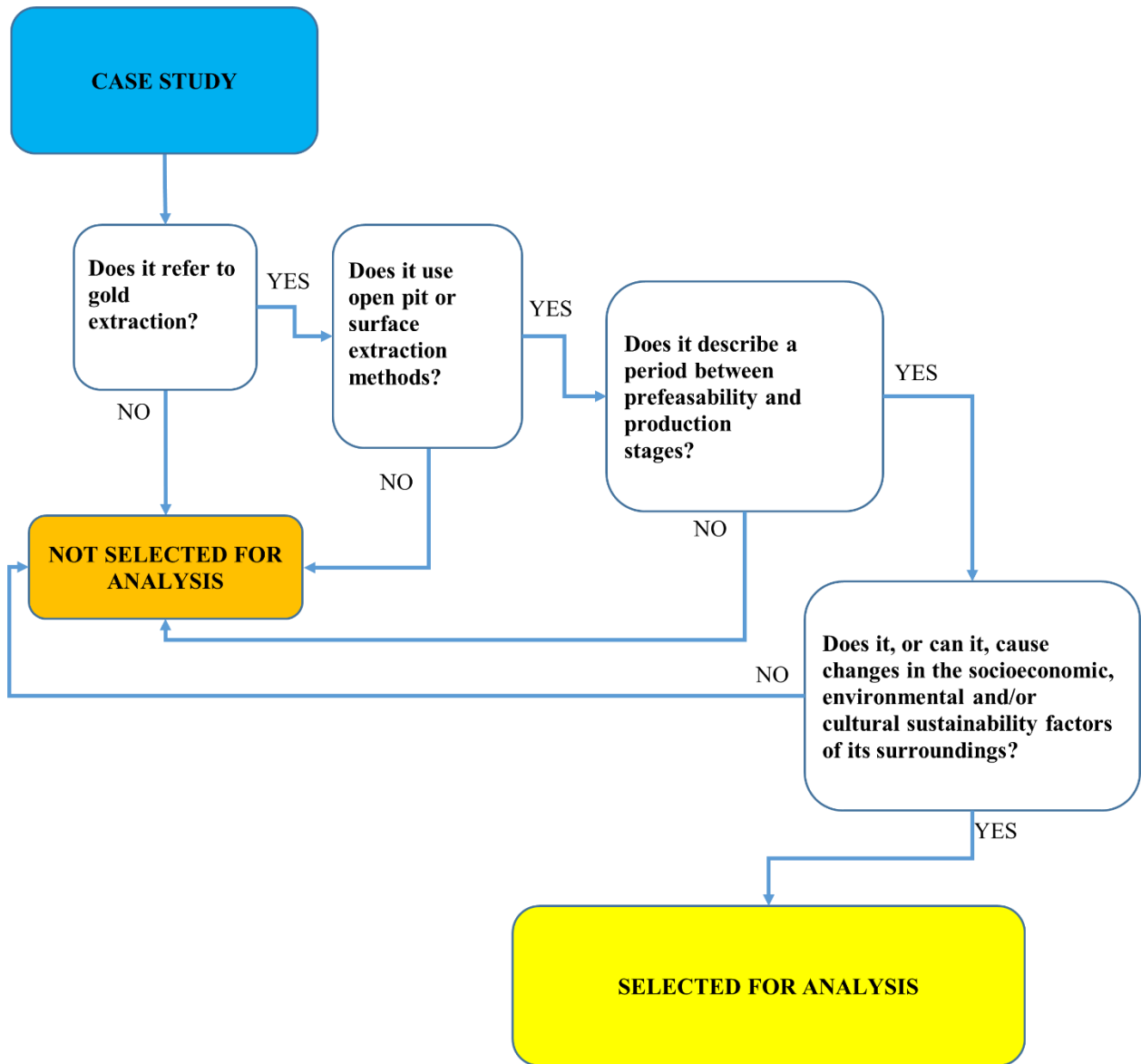


*Figure 1: General overview of the research methodology process*

### 3.1 Stage 1: Project identification and selection

#### 3.1.1 Case selection

The process shown in Figure 2 was developed to select cases meeting the specific criteria set in the scope of this research.



*Figure 2: Stage 1 of methodology: case study selection process*

## 3.2 Stage 2: Individual project analysis

### 3.2.1 Sustainability measures identification

Once a project case study was selected and the state of its operational continuity was determined, the principal measures taken by each mining company to address areas of local socioeconomic and environmental sustainability were identified and listed. This list was placed on the first column of the generic table shown in Table 1.

### *3.2.2 Comparison with global sustainability reporting standards - measure implementation foresight*

All of the sustainability measures taken by each company were then compared with the Global Reporting Initiative (GRI) Social and Environmental-reporting parameters to check if they were in line with some internationally accepted sustainability reference guidelines and were not just the result of goodwill practices. This set of sustainability reporting parameters were selected as comparison reference because they are one of the most important mainstream protocols used by companies to report their sustainability initiatives (*The KPMG Survey of Corporate Responsibility Reporting, 2013 and 2016*). Every measure taken in each project was given the value of “1” if it resembled at least one of the parameters of the GRI protocol sets or “0” if it did not. This information went into the second column of the table shown in Table 1

After this, it was determined if each of the measures taken in each project were actually foreseen, as part of a plan, or were merely reactions to circumstantial events associated to the project. This information is important because it is currently part of the mainstream corporate social responsibility practices (*Mutti et al, 2011; Hilson, 2012*). In case a measure was foreseen, it was assigned the value of “1” or “0” if not, and registered in the third column of the table in Table 1.

The values of “1” and “0” were used to create a numeric edge for calculating what percentage of measures from each project comply with GRI sustainability reporting standards, and what percentage of them are actually part of a foreseen sustainability plan. This information will be used later in Stage 3 of this methodology.

### *3.2.3 Financial costs of measures per area of local socioeconomic sustainability*

The costs of every measure identified in each project were recorded from the case study or, if not reported there, inferred by using benchmarking figures. These figures were placed in the fourth column of the analysis chart shown in Table 1, and converted to US dollars using the exchange-rate average at the time the measure was implemented.

In order to categorize the obtain information and facilitate its latter analysis and discussion, 5 different areas of local socioeconomic sustainability were defined in the line of previous studies on this subject (*Franks, 2012; Suopajärvi et al, 2014*), namely:



- *Infrastructure*: meaning expenses made in all types of buildings and civil works whose main purpose is to provide public service to the majority of the population, such as roads, water pipelines, bridges, etc. This category excludes buildings for educational and health purposes, and infrastructure that serves specific economic activities that are not common to the majority of the population.
- *Education*: meaning all expenses made in buildings, programs, salaries, purchases, etc., that are directly related to primary and secondary education of the population.
- *Health*: meaning all expenses made in buildings, programs, salaries, purchases, etc., that are directly related to maintaining the physical health of the population by means of allopathic medicine and procedures.
- *Local economy*: this includes all expenses made in training programs, purchases, infrastructure, etc., that aim to support local economic activities.
- *Other areas stemming from community engagement and dialogue*: this covers all expenses made in other areas that were agreed upon by the company and the population such as support for local festivities and celebration and other leisurely activities.



Once each measure was classified according to one of the five areas just mentioned, the cost percentage for each one was placed between the fifth and the ninth columns of the table shown in Table 1. This percentage was obtained by dividing the cost of each measure by the total cost of sustainability measures of each project.

### *3.2.4 Perception-of-benefit of the local population to each sustainability measure*

This part of the research involves determining how the local population perceived the benefit of each sustainability measure on their own well-being and on the environment surrounding them, since this seems to be an important factor in mine project development and community relations (Webb, 2010; de Waal and Ortocoma, 2011; Ololade and Annegarn, 2013). The term “*benefit*” in this paper is defined as follows:

- *Benefit to the local population*: meaning the effect of a sustainability measure taken by a mining company was perceived by the local population as helping to maintain and/or improve their way of living, as reported in the case study.
- *Benefit to the environment*: meaning the effect of a sustainability measure taken by a mining company was perceived by the local population as leading to prevent, protect and/or mitigate changes in terrain, water, air, soil, flora and fauna of the area in which a mining project takes place, as reported in the case study.

**PROJECT NAME**

PROJECT NAME			Cost of individual sustainability measure	% of expense on areas of local socioeconomic sustainability					Perception-of-benefit of the local population of each measure on:	
Sustainability measures	Similar to GRI	Foreseen or Reactive		Infrastructure (excluding educational and healthcare buildings)	Education (including educational buildings)	Health (including healthcare buildidings)	Local Economy	Other areas stemming from community engagment and dialogue	Their own well-being	The environment
Measure 1	1 or 0	1 or 0	\$ USD			%				.
Measure 2	1 or 0	0 or 0	\$ USD		%				.	.
.	.	.	.					%	.	.
.	.	.	.	%					.	.
.	.	.	.						.	.
Measure n	1 or 0	1 or 0	\$ USD				%		.	

*Table 1: Generic table for individual project analysis*

In cases in which the local population perceived that sustainability measures were related to actions aimed at upholding what is described in the previous two definitions, such measures are rated as “*beneficial*”; language in the case study such as “beneficial, very important, very good, worthy, coherent, amicable, friendly, essential, etc.” described this level of perception. Those that accomplished only part of the definitions are rated as “*slightly beneficial*”; language in the case study such as “good, necessary, relevant, important, of interest, etc.” described this level of perception. Measures that neither created a perception of benefit nor a perception of loss or disadvantage to the population are rated as “*null or none*”; language in the case study such as “limited, none, not relevant, etc.” described this level of perception. In cases where measures were perceived as related to a state of loss or disadvantage to the local population are rated as “*slightly adverse*”; language in the case study such as “bad, unfortunate, harmful, damaging, unsatisfactory etc.” described this level of perception. Finally, measures that were perceived as related to a state of severe loss or disadvantage to the local population are rated as “*adverse*”; language in the case study such as “detrimental, severe, tragic, irreparable, irreversible, etc.” described this level of perception.

A number-and-color key for each rating category was developed as follows:

- *beneficial*: (“2” – green)
- *slightly beneficial* : (“1” – blue)
- *null or none*: (“0” – yellow)
- *slightly adverse*: (“-1” - orange)
- *adverse*: (“-2” - red)

These ratings of perception-of-benefit to the local population’s well-being and to the environment were placed in the tenth and eleventh column of the table shown in Table 1, respectively. The values of “2, 1, 0, -1, -2” were used to create a numeric edge for later estimating, in Stage 3 of this methodology, the average perception-of-benefit of the population of the *combined measures* taken by companies in each project.

### *3.2.5 Dialogue and community engagement process description*

Finally, it was important to summarize how the process for engaging and dialoguing with the local population take place in each project (*Kemp and Owen, 2013; Moffat and Zhang, 2013; Tiainen, 2016*). This summary was prepared by identifying some key steps taken by the mining companies in approaching the local population, describing how the population responded to such approach, and any possible effect of this response on the project’s operational continuity.

### 3.3 Stage 3: Collective project analysis

#### 3.3.1 Conjugation of individual project information into collective analysis table

Once all selected case studies were given the treatment described between points 3.2.1 and 3.2.5 of Stage 2 of this methodology, a new summary analysis chart was developed with all that information. This new table is shown in Table 2.

This analysis chart assigned one row for each project. In the first column, all the selected projects names were listed. In the second column, the percentage of the total measures resembling with at least one of the *Global Reporting Initiative (GRI)* Social and Environmental reporting sets, taken by each project, was registered. In the third column, the total number of foreseen measures were placed as a percentage of the total number of measures taken in each project.

In column 3 of Table 2, the total amounts spent by each company for all of the sustainability measures taken were registered. In the remaining columns, the percentage of the expense made by the company in actions and strategies for each of the five broad categories used in the individual case study analysis in part 3.2.3 of Stage 2 of the methodology, were placed.

Then the overall perception-of-benefit of the local population to their well-being and to the environment, based on the total number of measures taken by each project, was determined using the same logic described in part 3.2.4 of Stage 2 of this methodology. The final rating per project for each of these two areas of perception was determined by averaging the numerical values of the perception-of-benefit in columns 10 and 11 of each individual project analysis table. The mathematical expression used for determining each average per project is:

$$\forall M_i \neq 0 \Rightarrow I_i = \frac{\sum_{i=1}^n M_i}{n}$$

Where:

$I_i$  = average rating of perception-of-benefit of all the measures per project

$M_i$  = individual rating of perception-of-benefit per sustainability measure per project, ranging between -2 and 2, minus zero

$n$  = number of measures rated different from zero

The calculated average ratings per project of perception-of-benefit to the well-being of the local population and to the environment were placed in the tenth and eleventh columns of the table shown in Table 2, respectively

### *3.3.2 Collective dialogue and community engagement process description*

Finally, with the information generated in step 3.2.5 from Stage 2 of the methodology a summary table was developed. This table gathered the salient features of each individual project's community dialogue and engagement process, helped to look for similarities between the ways different projects have undertaken this process and identify what elements seem to be linked to maintaining operational continuity.

			Total amount spent on local socioeconomic sustainability measures	% of expense on areas of local socioeconomic sustainability					Overall perception-of-benefit of the local population of the totality of measures per project on:	
% of measures complying with GRI Social and/or Environmental protocols per project	% of foreseen measures per project			Infrastructure (excluding educational and healthcare buildings)	Education (including educational buildings)	Health (including healthcare buildings)	Local Economy	Other areas stemming from community engagement and dialogue	Themselves	The environment
<b>Project 1</b>	%	%	USD	%	%	.	.	%	-2 -1 0 1 2	.
<b>Project 2</b>	%	%	USD	%	%	.	.	%	.	.
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
<b>Project n</b>	%	%	USD	%	%	.	.	%	.	-2 -1 0 1 2

*Table 2: Generic table for collective project analysis*

## 4. RESULTS AND DISCUSSION

### 4.1 Case selection

From a pool of over seventeen potential case studies, only seven met the criteria required by the scope for this research synthesized in Figure 1. The projects are Geita Gold, Obuasi, Maricunga, Caspiche, Eagle Gold, Yanacocha and Pascua Lama.

The Geita Gold project in Tanzania is located in an area where mining activities have existed traditionally. The case study of this project (*Chr. Michelsen Institute, 2006; Lange S., 2006*) describes a period between 2001 and 2003, during the production stage of the project's development. During this period, the company did not face interruptions of its operations.

Obuasi, located in Ghana, is a project emplaced in an area with over 100 years of mining history. This project is described in a case study spanning two years, between 2005 and 2007 (*ICMM, 2007*), during which operational continuity was maintained in the project's production stage, despite the presence of significant illegal mining.

High in the Chilean Andes the Maricunga project is situated inside the territorial lands of the Colla indigenous people. This project's case study (*Ryerson Institute, 2010*) describes how operational continuity was maintained during the period 2005 – 2010 by means of well-planned community engagement.

Caspiche project is also located in the Chilean Andes but in area outside indigenous lands. This project is in its early stages of feasibility. The reference material for this project (*IMPC, 2014*) describes the process the company followed in 2013-2014 for adapting mine design, and water and energy supply to minimize negative impact on the surroundings.

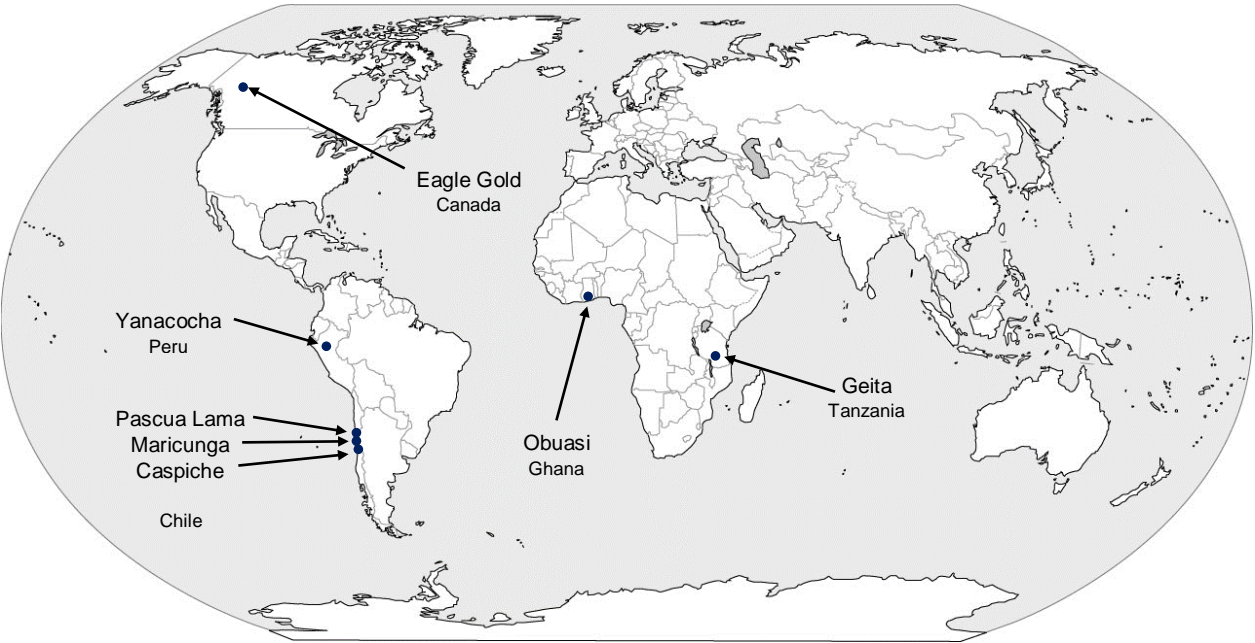
In northern Canada, in the Yukon region, amidst the territorial lands of the Na-Cho Nyak Dun First Nation indigenous people, the Eagle Gold project is located and in its latter stages of feasibility. Through a careful approach to community engagement, this project has been able to continue developing during the period of 2014 and 2016 without interruptions (*Becerra et al., 2015; Geens, 2017*).

The Yanacocha project, located in the Cajamarca region of northern Peru, started operations in 1993 under serious community rejection. The case studies (*Barreto et al, 2007; De Waál and Ortocoma, 2011*) describe a period between 2000 and 2006, but focuses mainly on the period

around a serious mercury spill that affected the soil, water and people, forcing the company to halt operations at a loss of 1.8 million dollars per day.

In the northern border between Chile and Argentina, the Pascua Lama project faced total shutdown during its stage of preparation for production (Smith, C., McCormick, E., 2014; Nolen, S., 2014). The information for this project covers the period between 2000 and 2013, focusing on the period that led to the halt of operations due to a series of unfulfilled agreements by the mining company.

A more detailed background for each project is offered in the Appendix section, along with a description of the main sustainability initiatives taken by each company. Figure 3 shows the geographical location of each project.



**Figure 3: Geographical location of selected projects**



## 4.2 Collective project analysis and discussion

### 4.2.1 Comparison with global sustainability reporting standards and measure implementation foresight

Amongst the first things that can be noticed in Table 3 is that all seven projects had taken measures towards upholding sustainability that included elements similar to those used in the *Global Reporting Initiative* Socioeconomic and Environmental reporting protocol sets; such measures were 80% to 100% similar with the sustainability reporting parameters of the GRI protocol sets.

It is interesting to notice that, despite Yanacocha and Pascua Lama undertaking sustainability measures resembling the GRI protocol reporting sets, both projects faced very serious interruptions to their operations. This could be linked to the fact that for Yanacocha none of the measures described in the case studies were anticipated, and in Pascua Lama's case, only 60% percentage of them were actually foreseen. On the other hand, all the measures aimed towards upholding sustainability taken by the five projects that maintained operational continuity were planned and foreseen.

These initial observations point out a relationship between planning and foreseeing sustainability measures and the ability of a mining project to maintain operational continuity over a length of time, rather than reacting to circumstances. However, there does not seem to be a link between implementing sustainability measures resembling the GRI protocol sets and maintaining operational continuity.

			Total amount spent on local socioeconomic sustainability measures	% of expense on areas of local socioeconomic sustainability					Overall perception-of-benefit of the local population of the totality of measures per project on:	
	% of measures complying with GRI Social and/or Environmental protocols per project	% of foreseen measures per project		Infrastructure (excluding educational and healthcare buildings)	Education (including educational buildings)	Health (including healthcare buildings)	Local Economy	Other areas stemming from community engagement and dialogue	Themselves	The environment
<b>Geita</b>	85%	100%	\$ 3.897.453,00	29%	14%	14%	14%	29%	2	1
<b>Obuasi</b>	100%	100%	\$ 6.737.000,00	50%	17%	17%	17%	0%	2	2
<b>Maricunga</b>	80%	100%	\$ 1.235.000,00	40%	20%	0%	20%	20%	2	2
<b>Caspiche</b>	100%	100%	\$ 6.000.000,00	66%	0%	0%	0%	34%	1	1
<b>Eagle Gold</b>	100%	100%	\$ 440.000,00	0%	45%	0%	5%	50%	2	2
<b>Yanacocha</b>	100%	0%	\$ 35.200.000,00	33%	0%	50%	17%	0%	-1	-1
<b>Pascua Lama</b>	100%	60%	\$ 86.550.000,00	92%	2%	0%	0%	6%	0	-1

**Table 3: Collective project analysis table**

Color and Number Key:

beneficial: (“2” – green)  
 slightly beneficial : (“1” – blue)  
 null or none: (“0” – yellow)  
 slightly adverse: (“-1” - orange)  
 adverse: (“-2” - red)

#### *4.2.2 Financial costs of measures and distribution per area of local socioeconomic sustainability*

As seen in column 4 of Table 3, there is a wide range of amounts of financial resources used in each project for sustainability measures, as reported in the case studies. This difference is due to the difference in project magnitude, i.e. capital investment, production tonnage, company size, etc. In a way, it appears that the larger a project, the more expense it makes in sustainability measures.

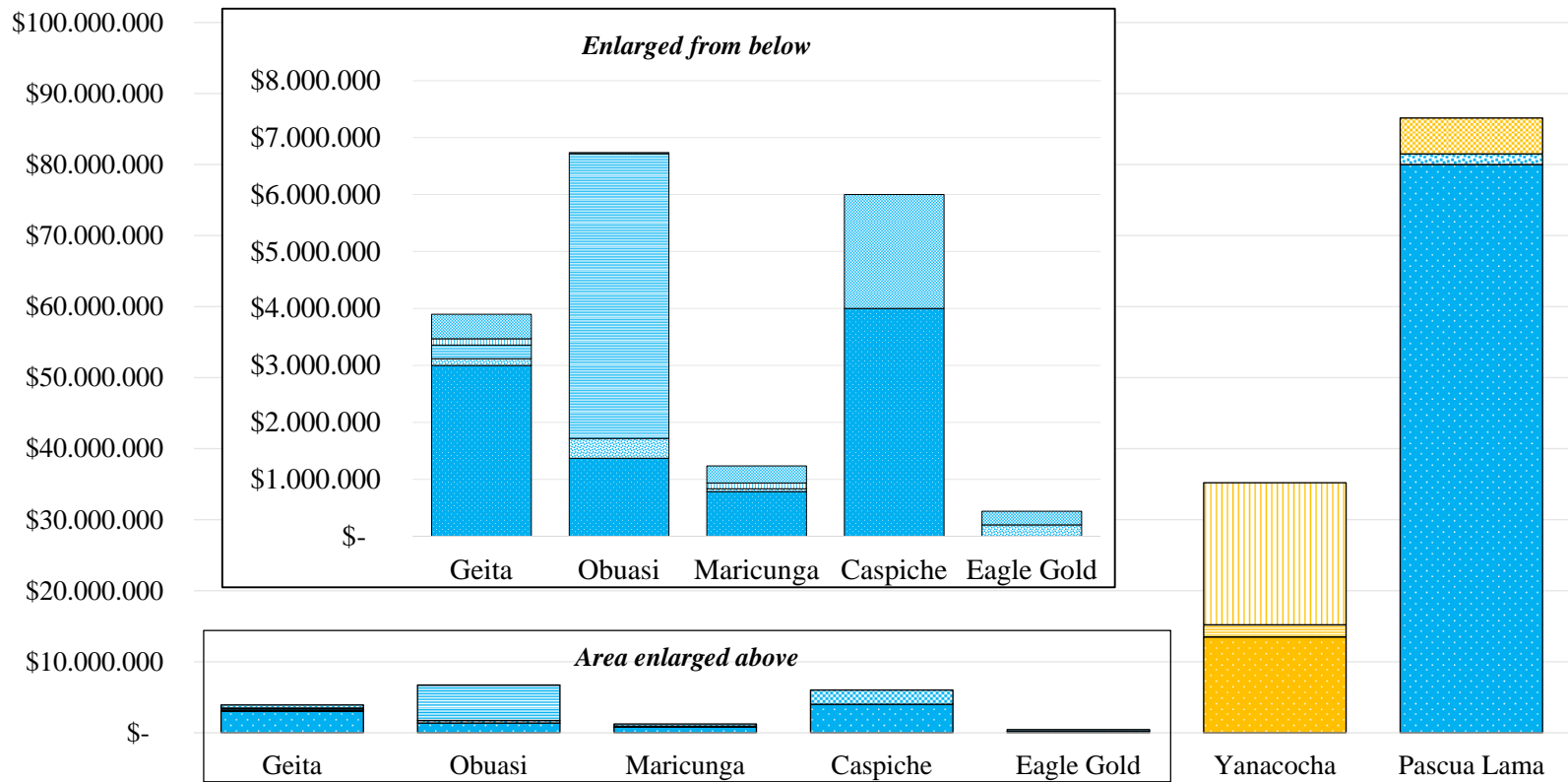
However, it is interesting to notice that projects that faced serious difficulties with operational continuity used much higher amounts of money, averaging almost 9 times more than projects that did not face this kind of challenge. This can be seen in the large amounts spent by Pascua Lama in building a watering system for the farmers in the valley below the mine, for around 60 million dollars. However, as described in Appendix 1, this measure mostly benefited the fewer larger farmers, creating a sense of alienation in the smaller farmers who comprise the majority.

Figure 3 offers a comparative depiction of the different amounts used by each project.






As seen in Table 3, the majority of measures taken by the all projects to address socioeconomic sustainability areas were mostly concentrated on buildings and infrastructure, with an average of 52% of expense of their total amount for this particular area of sustainability. It is very interesting to notice that the second area of expense of a mining company was in regards to other commitments stemming from community engagement and dialogue, such as funding for local races and outdoor activities, with an average of 28% of the total expense. This is followed by a close average of 27% in health measures, 20% in education and 15% in local economy.

From this analysis, it seems that there are two main issues regarding the way money is spent in sustainability measures. First, as seen in Figure 3, it seems that the total amount of money spent does not necessarily mean that the sustainability measures will be perceived as beneficial. This can be seen better in the larger projects that spent millions and yet faced serious interruptions, whereas projects that disbursed much lower sums (e.g., Eagle Gold, which spent an average of 440.000 dollars, the lowest of all seven projects) were able to maintain their operational continuity.



The second issue has to do with the area of local sustainability that mining companies spend money in. All seven projects spent most of their resources in infrastructure that could be useful for long periods of time, and even after the mining project finishes. Investment in infrastructure, then, is an area that seems to be important to bear in mind in local sustainability plans as it may have an impact on maintaining operational continuity.



**Pattern meaning**

-  Infrastructure
-  Education
-  Health
-  Local Economy
-  Other factors

**Color meaning**

-  Foreseen measures
-  Unforeseen measures

**Figure 4: Comparison of amounts of expense between projects in foreseen and unforeseen measures for different factors of local socioeconomic sustainability**

### *4.3.3 Perception-of-benefit of the local population to sustainability measures*

It is interesting to notice a clear difference of perception-of-benefit between projects that were able to maintain operational continuity and those that did not. In the first five projects on Table 3, four of them had a rating of “2”, meaning that the population perceived that the measures taken by each company were “beneficial” to their well-being.

Regarding the *perception-of-benefit on the environment*, these five projects also have a very good rating. With the exception of Geita and Caspiche, in which measures taken by the company were perceived as “slightly beneficial”, because benefit to the environment was a by-product of measures aimed at human well-being, the remaining three projects did get the highest rating of perception.

As to Yanacocha and Pascua Lama, the ratings of perception-of-benefit are low, averaging -1 “slightly adverse” for both areas of perception. In Yanacocha’s case, this could be related to the events and perceptions generated around the spill of 150 kilograms of mercury in 2000. Although the measures the company took to correct that situation did have resemblance to certain emergency response protocols (*OSPPEA, 2002*), the community, which opposed the project from the very start and was thus biased against the company, perceived them as coming too late, and mostly focused on the initial attempt of the company to conceal the degree of contamination the spill caused. Concerning Pascua Lama, the low rating average comes mostly from a perception that the company was destroying glaciers that are very important to the community, both culturally and environmentally. Although the company was compelled to stop glacier removal, this did not repair the perception of the population.

### *4.3.4 Dialogue process and community engagement analysis*

A summary of the most relevant points concerning general dialogue and community engagement for the seven selected mining projects is offered in Table 4. One of the first things that becomes known is that, in all cases, companies did engage to some extent in community dialogue. In the cases of companies with little or no issues with operational continuity, dialogue was started ahead of the start of extraction operations, making sure that the right stakeholders were engaged promptly and in a manner that build trust and confidence.

This can be especially seen in the Maricunga project, in which tension and suspicion created by the previous company in charge was actually reversed into trust and cooperation. In these cases, the dialogue processes was initiated by the companies themselves, as part of their global project strategy. This same foresight is also a key feature of the other projects that did not face challenges to their operational continuity.

As for Yanacocha and Pascua Lama, the dialogue process did not start in a way that the population perceived as clear and honest, therefore creating certain alienation to the company that later turned into full-scale opposition. In the Yanacocha case, it appears that government support played a role in making the mining company feel safe to bypass a more holistic dialogue process. In these projects, once the possibility of dialogue was broken, it put them in an irreversible spin of increasing tensions and mistrust, with financial and legal implications.

<b>General dialogue and community engagement process for each selected project</b>	
<b>Geita</b>	Started before project operation, in planned community approach, identifying collectively the needs and wants of the population and what they expected from the company.
<b>Obuasi</b>	
<b>Maricunga</b>	Started before project operation, with careful strategy to engage local indigenous community alienated by previous mining operations. Process highlighted the critical issues to address for peaceful relationship, mainly the management of water rights and road maintenance. Trust was built from the start by making dialogue a sign of goodwill from the company, and by signing agreements over the points discussed in the engagement process.
<b>Caspiche</b>	No direct community engagement described, but started with open PR campaign to share project development vision with media and mining circles, thus creating a positive outlook for the project
<b>Eagle Gold</b>	Strong, direct and consultative communication with local indigenous authorities, sharing extensive details on project technical and environmental matters, creating a trusting relationship between community and company, and showing that the company is willing to adapt the project according to points stemming from continuous dialogue.
<b>Yanacocha</b>	Initially addressed only part of community stakeholders, creating tensions and mistrust that was only increased by armed government intervention, and suggesting that with this kind of support dialogue was not important. When mercury spill occurred, there was no open channel of communication with community that could aid in managing the situation, and tensions increased. New dialogue started but required government intervention. Whatever measure taken to ameliorate the crisis was viewed by the population as tardy measures.
<b>Pascua Lama</b>	Started addressing a significant cross section of community stakeholders, mainly farmers, but did not continue doing so and instead engaged in talks with larger landowners of farming areas creating tensions among the rest of the population. When news of glacier removal reached the public, the resulting outcry forced the company into new agreements to stop said removal, and build contaminated water retention system at mine. Once news reached that the company was violating those agreements, the project was shutdown.

*Table 4: Summary of dialogue and community engagement process*

From the perspective of dialogue process and community engagement, there seems to be a certain correspondence between projects that were able to continue their operations and open and unbiased dialogue, starting from the beginning and as part of an overall approach to community relations.

On the other hand, it can also be inferred that the local population does not pay attention to the nature or quality of a sustainability measure if it comes late and in reaction to a situation that threatens their way of living.



## 5. CONCLUSIONS

Based on these seven cases, it seems that one of the main factors that enabled these mining projects to benefit from operational continuity is to develop an open and honest dialogue started by the mining company with the community surrounding the project. There is a link between the trust and confidence that is built through adequate, friendly and timely community dialogue and the ability of the company to develop its mining project. Companies that engaged in this kind of dialogue did not face serious operational interruptions.

Another aspect that seems to favor operational continuity is how timely the execution of measures aimed at fostering sustainability comes about. There seems to be a positive effect on operational continuity when such *measures are implemented at the times agreed upon with the community* as part of the mining plan. On the other hand, when measures are reactively improvised in the face of an already hostile environment, there seems to be a significant reduction in the flow of operational continuity of a mining project.

There does not seem to be a direct relation between measures that follow GRI sustainability reporting guidelines, and operational continuity. However, there is a direct relation between the perception the community has of the measures taken by the company and the keeping of operational continuity. This can be particularly noticed in the cases with operational challenges, where many of the measures taken by the companies did meet GRI standards, but were negatively perceived by the population. In cases where operational continuity was maintained, the population did perceive the measures as adequate. *The rightly perceived measure, taken at the right time, favors operational continuity.* As a corollary of this, it is important for a mining company to find ways of developing favorable perceptions towards them that will become favorable attitudes later.

There does not seem to be a relation between the amounts of money spent on sustainability measures and the keeping of operational continuity; the population-perception factor seems to take precedence over amount of expense. However, there is link between percentages of expenditure in measures that benefit the population, mainly in infrastructure, and the ability of maintaining operational continuity.

Finally, it seems to be of common business and ethical sense that a mining company invests adequate time and resources to fund measures that aid to upkeep the well-being of the local population, in order to save itself the damage of public image and loss of revenue by facing operational continuity challenges. A mining company must engage completely and coherently in developing an understanding of what “sustainable development” means in each territory it is emplaced because such understanding varies from place to place and it has direct implications in the kind of measures it takes and on maintaining operational continuity.

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## 7. APPENDIX

This section provides:

1. A summary chart showing individual analysis for each project case study information
2. A written summary of some background information for each project, including historical facts, and specific information of each project's sustainability measures implementation

**Geita Gold Mine - Anglo Gold Ashanti (Case study covers information between 2001 and 2006) - Tanzania**

		% of expense on factors of local socioeconomic sustainability					Perception-of-benefit of the local population of each measure on:		
Similar to GRI	Foreseen or Reactive	*Cost	Infrastructure (excluding educational and healthcare buildings)	Education (including educational buildings)	Health (including healthcare buildings)	Local Economy	Other areas stemming from community engagement and dialogue	Their own well-being	The environment
Building of 200 Km water pipeline for villagers	1	1	\$ 2.000.000,00	51%				2	1
Geita-Iloghi road rehabilitation	1	1	\$ 1.000.000,00	26%				2	1
Building of 2 primary schools and 5 highschools	1	1	\$ 116.900,00		3%			2	0
Expansion of local hospital y building of 2 new health centers	1	1	\$ 241.249,00			6%		2	0
Creation of microcredit fund for local farmers	1	1	\$ 109.594,00				3%	2	1
Contribution to local social activities: Kilimanjaro Climb, anti AIDS campaign	1	1	\$ 123.493,00				3%	2	0
Payment to muncipal council for village relocation	1	1	\$ 306.217,00				8%	2	0

\* Values reported in case study

**Table 5: Individual analysis table for Geita Gold Project**

**Color and Number Key:** *adverse* (“-2” - red), slightly *adverse* (“-1” - orange), null or none (“0” - yellow), slightly *beneficial* (“1” – blue) *beneficial* (“2” – green)

## **Geita**

In the period before the case study, which covers the years 2001-2003, Geita Gold project was emplaced in an area with low access to running water and a high level of elementary education in the population, of around 80%. Since there had been some history of traditional small-scale mining in the area, the population did not oppose the project. However, there was very high expectation from the benefits it would produce for them.

### *Dialogue process and sustainability measures*

The company decided to undertake an open dialogue with various segments of the community, and came up with a broad plan of action. Among the salient features of this plan were the construction of a 200 km pipeline for taking water from Lake Tanganyika and distributing it to the surrounding communities, repaving the Gheita-Ilongi road that connects the area with the capital of the country, and construction of schools and hospitals in the area. In addition, the company created a fund that gave credit to local agricultural projects. All these measures are within the GRI protocols, specifically meeting the SO1 and SO10 parameters. The overall cost of all the measures was of around 4M dollars over the three-year span described in the case study. All the measures taken by the company were planned and responded to what was agreed with the population. The road construction and pipe laying were done between 2001 and 2002, and the construction of schools and hospitals, and the financing of credit for agriculture were executed evenly over the 3 years of the case study. Overall, the local population was the main beneficiary of these measures, with no direct benefit the mining operational procedures. The reaction of the population was positive in general, since the measures taken by the company were as agreed, and at no point did the company need to recourse to palliative measures due to some unforeseen event. During the period described by the case study, the company enjoyed operational continuity with no interruption of its mining operation caused by the surrounding community.



**Obuasi Gold Mine - Anglo Gold Ashanti (Case study covers information between 2005 and 2007) - Ghana**

			% of expense on factors of local socioeconomic sustainability					Perception-of-benefit of the local population of each measure on:		
	Similar to GRI	Foreseen or Reactive	* Cost	Infrastructure (excluding educational and healthcare buildings)	Education (including educational buildings)	Health (including healthcare buildings)	Local Economy	Other areas stemming from community engagement and dialogue	Their own well-being	The environment
Downtown road improvement and pavement	1	1	\$ 1.000.000,00	14,8%					2	2
Contribution to government water distribution project	1	1	\$ 250.000,00	3,7%					2	0
Electricity generation for Sansu and Anynam villages	1	1	\$ 120.000,00	1,8%					2	0
Construction of schooling infrastructure, contributions to teachers salaries, and general scholarships	1	1	\$ 347.000,00		5,2%				2	0
Construction of health centers and hospital expansions	1	1	\$ 5.000.000,00			74,2%			2	0
Funding for local guinea pig, fish and snail farming projects	1	1	\$ 20.000,00				0,3%		2	0

\* Values reported in case study

**Table 6: Individual analysis table for Obuasi Gold Project**

**Color and Number Key:** adverse (“-2” - red), slightly adverse (“-1” - orange), null or none (“0” - yellow), slightly beneficial (“1” – blue) beneficial (“2” – green)

## **Obuasi**

The Obuasi project in Ghana is located in area with over 100 years of mining activities. Obuasi Town, which is the town located right next to this mining project, was born when mining operations began in the last century. The overall region has around 200k inhabitants, served by adequate urban facilities by Ghanaian standards. There is a strong presence of informal miners, up to 20K, grouped in a kind of Association, and have a strong voice in social matters. This could pose as opposition to formal mining in the midst of a population that generally looks towards this activity favorably. The case study covers the period 2005 – 2007, when the mining project was in the initial stages of its production stage.

### *Dialogue process and sustainability measures*

In order to start production, the company initially engaged in community dialogue and identified some key aspects that were important to the community. That led to a plan in which the company improved road conditions in the town, especially in the areas where most of the company's transit occurred. Also, as agreed with the community, provisions were made for providing electricity for the town, which actually brought people in from other areas in order to take advantage of free electricity. Teacher's salaries were covered by the company and major investments were made for the improvement of infrastructure in the local hospital. These main actions taken by the company do comply with the parameters set by GRI, meeting fully the criteria set by the SO1 and SO10 protocols. In the period reported by the case study, the measures taken by the company cost the sum of \$6.727.000 USD, which mainly benefited the local population, but also the company's truck-hauling operations over the roads it improved. The population was satisfied with the measures since they were done at the agreed times and, during the period reported, the company did enjoy operational continuity with no interruptions from the community whatsoever, and not even by the illegal miners who potentially posed as threat to the company's operation from the very beginning.

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***Table 7: Individual analysis table for Maricunga Project***

**Color and Number Key:**

*adverse*  
("2" - red),  
*slightly adverse*  
("1" - orange),  
*null or none*  
("0" - yellow),  
*slightly beneficial*  
("1" - blue)  
*beneficial* ("2" - green)

Notes related to the Table:

<sup>a</sup>Cost based on estimate taken from <http://www.compragua.cl/buscador-tabla-en-dolares-usd> for neighboring Charaña river,  
last checked on November 2016, quoted in US dollars

<sup>b</sup>Cost estimated from personal communications with civil engineers, quoted in Chilean pesos, at an exchange rate of 548 CLP/USD  
for the year 2009, in which the measure was implemented

<sup>c</sup>Cost estimated from personal communications with contacts in respective field, quoted in Chilean pesos, and converted to USD at 548 CLP/USD

**Maricunga Project - Kinross (Case study covers information between 2005 and 2010) - Chile**

			% of expense on factors of local socioeconomic sustainability					Perception-of-benefit of the local population of each measure on:	
Similar to GRI	Foreseen or Reactive	Cost	Infrastructure (excluding educational and healthcare buildings)	Education (including educational buildings)	Health (including healthcare buildings)	Local Economy	Other areas stemming from community engagement and dialogue	Their own well-being	The environment
1	1	\$300.000,00					24,3%	2	0
1	1	\$ 715.000,00	57,9%					2	2
1	1	\$ 70.000,00	5,7%					2	0
1	1	\$ 50.000,00		4,0%				2	0
0	1	\$ 100.000,00				8,1%		2	0

## **Maricunga**

In the midst of ancestral territories of the Colla people of northern Chile lies the Kinross Maricunga project. This project is one of the many mining operations in the area, which has seen medium and large scale mining for over 30 years. In general, the perception of mining in the people of the area is not very positive, with the impression that the companies are a source of trouble for their lifestyle; any new mining activity is viewed with suspicion.

### *Dialogue process and sustainability measures*

The Maricunga project changed many hands over the years, until 1998 when Kinross bought the mining rights. In the period 2005-2010 reported by the case study, the mining project entered into its production phase after a prolonged dialoged period that spanned over almost seven years, until compromises were reached and a clear understanding between the community and the company was developed. The main aspect of importance to the community was the availability of water, access to water rights, and road maintenance. For this, the company agreed to help to local community to gain access to water rights from the Jorquera River offering legal assistance for the entire process. Also, the company agreed to give maintenance to the main road leading to the mine, as it was the only one available for the people in the area and was used by the company for regular truck transit. Additional measures were taken by the company by providing elementary and secondary education scholarships, the construction of a dam for alfalfa growing irrigation, and the financing of local cattle breeding initiatives. All the measures comply with the GRI SO1 and SO10 reporting protocols, costing around \$1.235.000 USD. The process for acquiring water rights for the community was taken in 2005, right before the start of production, while the other measures spanned between 2005 and 2010. During the period reported in the case study, the population was satisfied by the measures taken within the accorded times, while the company enjoyed operational continuity.

**Caspiche Project - Exeter Resource Corporation ( 2013-2014) - Chile**

			% of expense on factors of local socioeconomic sustainability				Perception-of-benefit of the local population of each measure on:		
Similar to GRI	Foreseen or Reactive	* Cost	Infrastructure (excluding educational and healthcare buildings)	Education (including educational buildings)	Health (including healthcare buildings)	Local Economy	Other areas stemming from community engagement and dialogue	Their own well-being	The environment
Engineering studies for defining final pit with lower surface impact before starting underground operations	1	1	\$ 2.000.000,00				33,3%	0	2
Multi-source energy provision project, combining national electrical grid from Copiapó to mine site, solar and wind self-generation, to avoid using thermoelectric sources	1	1	\$ 3.000.000,00	50,0%				1	1
Water provision project for mining activities extracting underground water, upkeep of freatic level using water injection, snow harvesting, to avoid using close-by rivers	1	1	\$ 1.000.000,00	16,7%				1	1

\* Values obtained through personal communication with mine project consultants in Santiago de Chile, prices quoted in Chilean pesos and converted to US dollar at an exchange rate for 2014 of 582 CLP/USD

**Table 8: Individual analysis table for Caspiche Project**

**Color and Number Key:** *adverse* (“-2” - red), *slightly adverse* (“-1” - orange), *null or none* (“0” - yellow), *slightly beneficial* (“1” – blue) *beneficial* (“2” – green)

## Caspiche

### *Sustainability approach*

The Caspiche project is emplaced in the Atacama Region of northern Chile as well, in an area close to Kinross Maricunga, where medium and large scale mining operations have taken place since the last century. The persistent and most common issue for the people in the area is the question of water availability for their own needs; there is an ongoing perception that every mining project “robs” them their water and, in many instance, very serious conflict has arisen from this. This mining project, when analyzed, was in its feasibility phase, where many options for mine design were being considered. For the project to move forward, the company sought to create a positive perception towards its intended operations, and socialized in various forums its ideas and projections. For this, the company looked for the least invasive, positive return of investment, mining option, and came up with an initial small pit pile-leaching, followed by underground operations, to reduce surface impact. Also, the company decided to use a combination of solar, wind, and traditional power grid electricity for its operations. Regarding water supply, the company hired studies that eventually recommended harvesting snow, which normally sublimates at a rate of 80%, and infiltrating it into the water-table as a reservoir in the freatic areas; use of river water has been completely discarded. All these measures comply with GRI Environment protocols EN26, EN3, EN4 and EN8. They have so far cost around 6 million dollars, between 2013 and 2014. From what could be ascertained from the media and mining forums, the company is viewed in a positive light because of the care it is giving to the design and selection of options for its operations, and has not faced any opposition that could hinder the project from moving to its following stage.

**Eagle Gold - Victoria Gold Corp ( 2011-2013) - Canada**

		% of expense on factors of local socioeconomic sustainability					Perception-of-benefit of the local population of each measure on:		
Similar to GRI	Foreseen or Reactive	* Cost	Infrastructure (excluding educational and healthcare buildings)	Education (including educational buildings)	Health (including healthcare buildings)	Local Economy	Other areas stemming from community engagement and dialogue	Their own well-being	The environment
Workshops with local indigenous community to discuss project development	1	1	\$ 200.000,00				45,0%	2	0
Signing of Mutual benefits agreement with local indigenous residents to provide job opportunities and local sourcing	1	1	\$ 20.000,00			5,0%		2	0
Scholarship program for local young people to reduce schooling desertion	1	1	\$ 200.000,00	45,0%				2	0
Communication strategy for local population for sharing safety and environmental protocols	1	1	\$ 20.000,00				5,0%	2	2

\* Estimated values obtained from personal communication with expert in community engagement

**Table 9: Individual analysis table for Caspiche Project**

**Color and Number Key:** adverse (“-2” - red), slightly adverse (“-1” - orange), null or none (“0” - yellow), slightly beneficial (“1” – blue) beneficial (“2” – green)



## **Eagle Gold**

### *Community engagement and dialogue process*

In northern Canada, in deep in the Yukon, is Eagle Gold mining project. This project is emplaced in the Na-Cho Nyak Dun First Nation territories, which has a very well organized community structure and hold some autonomy over decisions taken within their territory. This mining project is in the early stage of pre-feasibility and the company engaged very deeply in community dialogue to identify the main issues at stake. From that process, it became clear that community expected a very high level of constant communication and sharing of plans from the company. In addition, ensuring employment of local people once the project started was identified as an important matter. Therefore, the company has been engaged in many meetings and workshops with the local community, in which it shares its ideas for all the phases of the project, such as how it plans to develop the mining pit, manage production operations, manage waste and eventually close down the mine. Also, the company signed an Employment and Opportunities agreement with the local council, by it ensuring that jobs are available. These measures comply with GRI protocols SO1, SO10, EN8, EN9 and EN10, costing and estimated of around 440.000 USD. From the case study and the media, the project has been moving forward with no reported setback.

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*Table 10: Individual analysis table for Yanacocha Project*

**Color and Number Key:**

*adverse*

(“-2” - red),

*slightly adverse*

(“-1” - orange),

*null or none*

(“0” - yellow),

*slightly beneficial*

(“1” – blue)

*beneficial* (“2” – green)

Notes related to the Table:

<sup>a</sup>Cost estimated from personal communication with consultants based in Guayaquil, Ecuador, quoted in US dollars

<sup>b</sup>Cost estimated from personal communication with healthcare provider based in Santiago de Chile, quoted in US dollars

<sup>c</sup>Cost estimated from personal experience in this kind of buildings

\* Value of measure quoted in case study

<sup>d</sup>Cost estimated from personal communication with civil engineers based in Santiago de Chile, with knowledge of prices in Peru quoted directly in US dollars

**Yanacocha - Newmont Mining (Case study covers period between 2000 and 2006) - Perú**

		% of expense on factors of local socioeconomic sustainability					Perception-of-benefit of the local population of each measure on:		
Similar to GRI	Foreseen or Reactive	Cost	Infrastructure (excluding educational and healthcare buildings)	Education (including educational buildings)	Health (including healthcare buildings)	Local Economy	Other areas stemming from community engagement and dialogue	Their own well-being	The environment
Mobilization of professional team for study and containment of mercury spill <sup>a</sup>	1	0	\$ 200.000,00		1,0%			-1	-1
Hiring of doctors, purchase of medical elements for long-term treatment of human mercury intoxication (1000 patients) <sup>b</sup>	1	0	\$ 1.500.000,00		4,0%			0	0
Provision of temporary housing for residents that required relocation from contaminated site (200 families) <sup>c</sup>	1	0	\$ 2.000.000,00	6,0%				-1	0
Initial financing of "Equality Fund" created after the spill to foster local economic activities *	1	0	\$20.000.000,00			57,0%		-2	0
Construction of roadway leading to mine bypassing local villages <sup>d</sup>	1	0	\$10.000.000,00	28,0%				-1	-1
Construction of reverse osmosis water treatment plant <sup>d</sup>	1	0	\$ 1.500.000,00	4,0%				-1	0

## **Yanacocha**

### *Community engagement and reactive sustainability measures*

High in the northern Andes of Peru, near the city of Cajamarca, lies the Yanacocha project. Community engagements started in the latter part of the 80's, but were immediately plagued by accusations from the community that the company was aiming at dividing them into groups in favor and against the project; this created a strong sense of mistrust in the majority of the people. Nevertheless, the project went ahead and started production in 1993, with strong government support. The case study for this projects covers the period between 2000 and 2006. On June 2, 2000, more than 150 kilograms of mercury were leaked on the road passing through the villages of San Juan, Choropamba, and Magdalena. Residents of the area were unaware of the danger of this and freely manipulated the mercury, even taking it to their homes. Once the company found out this, it immediately sent a team for containing the situation and started evacuation of the villagers. Soon after the company tried to cover-up, the situation by denying the mercury leak, but it was too late, since the media and government already found out. This attempted cover-up inflamed the already mistrustful population; the government shut down operations, which cost the company a loss of 1.8M dollars per day. The company decided then to take several actions, which included bringing in leading medical experts on mercury poisoning to aid in treating patients in local hospitals, and creating short-term housing for the villagers until their living environment could be cleaned. By 2003, in partnership with the government, it created a "Social Equity Fund" aimed at reducing extreme poverty in the region, and constructing an alternate road to completely bypass the populated areas. The measures taken to contain the mercury spill comply with the EN9, EN23 and EN26 environmental GRI reporting parameters, and the ones taken for attending the social features of the area comply with the SO1, SO9 and SO10 social GRI reporting 45parameters, costing an overall sum of 35 million dollars. The population perceived the measures as coming too late in an attempt to cover-up company negligence at a time when confidence had completely broken; in particular, the Social Equity Fund was considered a very tardy and untimely measure. Such was the uproar by the attempted cover-up that the government, yielding to popular pressure, prevented the company from expanding its mining operations to new areas in the vicinity.

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***Table 11: Individual analysis table for Pascua Lama Project***

**Color and Number Key:**

*adverse*

("2" - red),

*slightly adverse*

("1" - orange),

*null or none*

("0" - yellow),

*slightly beneficial*

("1" - blue)

*beneficial* ("2" - green)

Notes related to the Table:

<sup>a</sup>Cost estimated from personal communication with civil engineering consultant based in Chile

\* Value of measure quoted in case study

<sup>b</sup>Cost estimated from personal communication with mining consultant based in Santiago de Chile

**Pascua Lama - Barrick Gold (Case study covers period between 2000 and 2010) - Chile**

			% of expense on factors of local socioeconomic sustainability					Perception-of-benefit of the local population of each measure on:	
Similar to GRI	Foreseen or Reactive	Cost	Infrastructure (excluding educational and healthcare buildings)	Education (including educational buildings)	Health (including healthcare buildings)	Local Economy	Other areas stemming from community engagement and dialogue	Their own well-being	The environment
Building of bypass road to the mine to avoid local communities of the valley below the mine <sup>a</sup>	1	1	\$20.000.000,00	23,1%				2	1
Financing of works for improving irrigation infrastructure for the local fruit farmers*	1	1	\$60.000.000,00	69,3%				-1	0
Scholarship program for young people of the area, managed through the municipality of Alto del Carmen*	1	1	\$ 1.500.000,00		1,7%			2	0
Works aimed at stopping glacier removal from mining project area after public outcry <sup>b</sup>	1	0	\$ 50.000,00				0,1%	-2	-1
Building of mine peripheral system for avoiding mine water runoff to enter in contact with waterways used by local farming <sup>b</sup>	1	0	\$ 5.000.000,00				5,8%	-2	-2

## **Pascua Lama**

### *Community engagement and dialogue*

The Pascua Lama project is located in Chile, in the Atacama region, in an area where mining is a well-known activity high up in the Andes. In the valleys of the region, many farms and fruit plantations depending on water supply from rivers flowing from the mountains. The case study for this project covers the period between 2000 and 2013. Starting in 2000, the company started building a road bypassing the local villages in order to avoid contact with people; this road passed over many channels taking water to the farmers. The community engagement started soon after, but the fact that the road had been built over the waterways and with little or none previous knowledge of the people, created slight suspicions on the villagers. The company then started a broader strategy of community engagement aiming at local farmers and ways to address some of their needs. This led to dialogue with some farmers who turned out to be the largest in the area and who were not in good terms with the majority of the other, smaller farmers of the area, and created a perception in the smaller farmers that the company was siding with the powerful farmers and not with them. Because of this engagement process, the company agreed to provide funds for an irrigation system at a cost of around 60 million dollars. Tension between the villagers and the company started to build up. Following in the engagement process, the company also agreed to finance an educational scholarship for young people that would be managed by the municipality of Alto del Carmen. One of the main issues that the community feared would be affected by mining activities was the state of the glaciers within the mine site. These glaciers are held in high esteem by the population as a water provider for the rivers of the area and, as such, have an added cultural value to them. The company then started pre-stripping operations and, contrary to what it had agreed with the Chilean government, started removing the glacier. Once news of this reached the community, anger broke out and serious complaints were filed against to the government. By this time, the media found out of this, and started generating bad publicity for the company. The government ordered the company to halt glacier removal and it was forced to do so. As part of the agreement with the government, the company had to build a water-retention system around the projected mining zone in order to hold back water that met dust and mining contaminants and prevent it from draining into the rivers flowing down to the valley, before continuing mining operations. The company did so but, simultaneously, decided to continue with mining activities. Unfortunately for the company, one of the walls of the retention system collapsed and contaminated water leached into the water streams it was not supposed to touch. When this reached public attention, the government imposed a shutdown on the project. All of the measures taken by the company comply with the EN 21, EN23, EN26 environmental GRI protocols, and with the SO1, SO4, SO9 and SO10 social GRI reporting protocols. The relationship with the community was damaged from the beginning and it contributed to the atmosphere that led to the project shutdown.