ECONOMIC RESEARCH INSTITUTE

GUIDELINES FOR SOCIAL LICENSE TO OPERATE

For Local Mining Projects

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Ulaanbaatar | 2021
WWW.ERI.MN

Abstract

The study aims to prepare a baseline document to develop survey result shows that the frequency of contact with company personnel, procedural fairness, and perceived impact on social infrastructure affect community acceptance and approval by increasing or decreasing trust in the company. Our result confirmed trust as a strong and significant predictor of guidelines for the SLO and develop a social licensing evaluation methodology to promote sustainable mining development. The guideline was first completed based on an extensive literature review and international examples, mainly from Australia. Then, we created a sample questionnaire using the guideline and used the questionnaire to assess the SLO of a local silver mine. The findings from this survey and the challenges associated with conducting the survey were analyzed and used to further improve upon the guideline. The acceptance and approval of the company and mining project. Our findings are similar to Moffat and Zhang (2014) and other international studies.

JEL: C3, L70, Q32, Q34, R52

Keywords: Social license to operate, social acceptance survey, Mining, Trust, Community acceptance

Contents

List of Abbreviations

CSG	Coal seam gas
FGD	Focus group discussion
IFC	International Financial Corporation
KII	Key informant interviews
SAS	Social Acceptance Survey
SIA	Social Impact Survey
SLO	Social license to operate

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1. Introduction

In Mongolia, obtaining a social license to operate (SLO) is becoming an important issue in the mining sector. While there is no set definition for SLO, it is understood as the "the ongoing acceptance of a company or industry's standard business practices and operating procedures by its employees, stakeholders, and the general public" (ERI 2020). Thus, it is not enough for mining companies to only obtain a legal license from the government and other regulators, a social license is increasingly needed to operate mining activities in the country. This trend has already been observed on a global level.

Communities continue to become more aware of and concerned about how mining activities can affect local livelihood. Moreover, sustainability and the environmental impacts of industrial activities are also becoming more salient. In some instances, the detrimental social and environmental impacts of the mining sector have provoked community grievances against mining operations. There have been several cases where mining developments have been delayed, interrupted, or even shut down due to opposition from local communities. In other words, mine operations were halted since they could not earn a SLO from local communities and other stakeholders.

We found that although there are many mining companies in Mongolia, only a few implement measures aimed at obtaining a SLO. In addition, there are limited efforts in developing guidelines to assess SLO in Mongolia. In light of this gap in knowledge, the objective of this study is to create a guideline and methodology to assess SLO in Mongolia.

The guideline was first completed based on an extensive literature review and international examples, particularly from Australia. The guideline was then used to create a sample questionnaire that was employed to assess the SLO of the Salkhit Silver mine in Dundgovi province. The findings from this survey as well as the challenges associated with conducting the survey were analyzed and used to further improve upon the guideline. Adjustments to the guideline were also made based on constructive criticism and comments from JICA.

This report consists of the guideline to assess SLO as well as the survey results of the social acceptance survey conducted at the Salkhit silver mine. The final and improved guideline is comprised of three sections (Section 2, Section 3 and Section 4). Section 2 will provide an overview of the research that has been conducted on this topic and suggestions for mining companies on obtaining and maintaining a SLO. Section 3 will then focus on the methodology to evaluate the SLO with a focus on the social acceptance survey and its development tool. Section 4 will conclude the guideline and describe how a social acceptance survey can be conducted. Finally, the report will end an overview of the main results of the social acceptance survey conducted by the research team in Section 5.

2. Understanding the SLO

2.1. What is a SLO?

As previously mentioned, there is no universally accepted definition of SLO. It is broadly understood as the ongoing acceptance of a company and its operations by the local community and other stakeholders. The concept evolved from the notions of "corporate social responsibility" and "social acceptability" and is also linked to the concept of sustainability (ERI 2020). Many studies on the topic accept that the social license to operate can mean:

- **Ongoing acceptance and approval** of a mining development by local community members and other stakeholders that can affect its profitability (Prno and Slocombe 2012, Boutilier and Thomson 2011, Moffat and Zhang 2014)
- **Improved risk management**, as the inability to gain and maintain a SLO can lead to conflicts, delays, and additional costs associated with a project (International Finance Corporation 2021).

Interestingly, a SLO is not a formal agreement between the operating company and stakeholders, but is "the real or current credibility, reliability, and acceptance of organizations and projects" (ERI 2020). It is also particular in that it must be slowly earned and constantly maintained. The notion of earning or gaining the social license to operate gained traction in the 21st century in response to increased public concern over extractive operations and acted as a form of risk management for businesses (International Finance Corporation 2021). Since then, this term has been adopted in a wide range of industries and sectors, including mining companies, civil society and non-government organizations, government, consultants, pulp and paper manufacturing and alternative energy generation. In this report, the term will refer to SLO in the mining sector given the sector's importance to the Mongolian economy.

Moreover, a social license cannot be gained from a government ministry or by simply paying a fee (Lassonde 2003). It demands far more effort and resources to become a part of the community a company operates in. Without local community acceptance, a project cannot be implemented easily, if at all.

Lack of public acceptance can cause delays in obtaining funding and government approvals for projects and lead to other additional costs. According to Ernst and Young, maintaining the social license to operate is the fourth-biggest business risk facing the mining and metals industry. Gaining and maintaining a SLO is becoming increasingly crucial to long-term business viability.

The IFC (2021) defines the features of the SLO as follows. The SLO:

- Takes time to earn but can be lost very quickly. It is responsive to changes in perceptions of the company and the project and susceptible to outside influences.

- Does not mean that every individual stakeholder or group supports the project (or that there is consensus among the network of stakeholders) but does mean that there is broad social acceptance of the project.
- is rooted in the beliefs, perceptions, and opinions held by the local population and other stakeholders about the project
- is dynamic and nonpermanent. It is responsive to changes in perceptions regarding the company and the project and is susceptible to outside influences. The SLO must be earned, strengthened, and maintained.
- is usually granted on a site-specific basis, hence a company may have a social license for one operation but not for another.

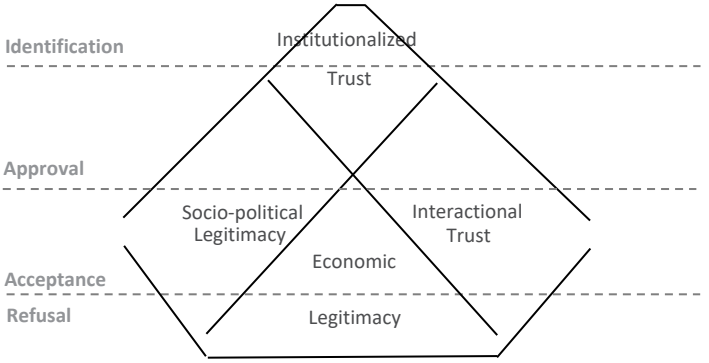
Overall, in order to obtain a SLO "a company must be seen operating responsibly, taking care of its employees and the environment, and being a good corporate role model" (ERI 2020). By doing so, the company will be able to create a mutually beneficial relationship with stakeholders affected by the project. The following section will look at specific studies related to SLO and the mining sector in detail.

2.2. What do studies recommend for the mining sector?

The first published work to define the social license to operate was probably by Joyce and Thomson (2000). They proposed that there is a social license to operate when mineral exploration or mining projects are seen as having the acceptance of society to conduct its activities. Furthermore, SLO can only come from the acceptance granted by local stakeholders. Such acceptability must be achieved on many levels, but it must begin with, and be firmly grounded in, the social acceptance of the mining project by local communities.

Thomson and Boutilier (2011) are considered the first researchers to propose a method measuring and analyzing the SLO. They identified four levels of SLO based on extensive interviews with villagers on their relationship with a Bolivian mine over a 15-year period. Their latest model has four levels of SLO: Refusal, Acceptance, Approval and Identification. In the theoretical model shown below, the level of SLO rises as we go up the model. Lower SLO levels indicate higher risks for the company. The lowest level of SLO is Refusal. At this level, the project is in danger of restricted access to essential resources such as financing, legal licenses, raw materials, labor, and public infrastructure. The next level of SLO is Acceptance of the project. Acceptance occurs when the community tolerates the operations of the company. If the stakeholders are satisfied and enthusiastically favor the activities, the social license could rise to the level of Approval. Over time, if trust is established, the social license could achieve Identification.

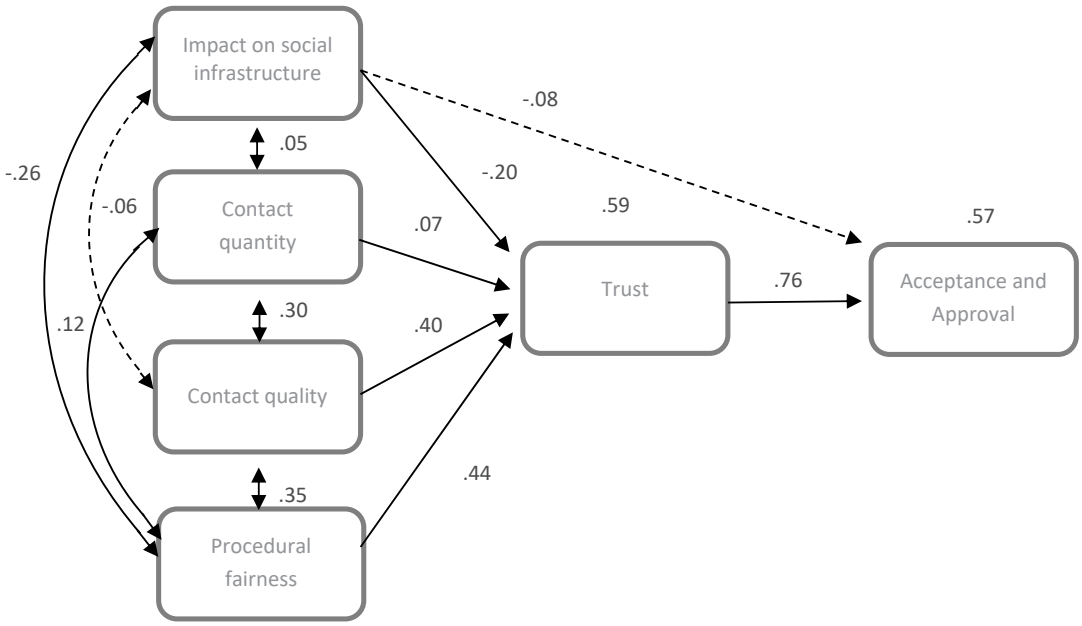
FIGURE 1. PYRAMID MODEL BY BOUTILIER AND THOMSON (2011, 2018)



Source: Adapted from Boutilier and Thomson (2011, 2018)

Only a few survey-based studies have been successful in quantitatively assessing the factors that influence SLO and their interactions with each other . One of these studies is the work of Moffat and Zhang (2014) on an large Australian coal seam gas company. In the study, they developed a model in which community trust in the mining company is central to obtaining a SLO and a strong predictor of community acceptance. They proposed the following hypotheses: (i) the impacts of mining on the social infrastructure of a community negatively affected trust, acceptance and approval of the company (ii) procedural fairness, quantity and quality of contact between the company's staff and the community strengthen trust in the company; and (iii) trust in the company positively influence its acceptance and approval by communities. Their path analysis found that all of the aforementioned factors, except quantity of contact, had statistically significant influences on project acceptance mediated through trust. Trust, in turn, was most influenced by perceived procedural fairness (β=0.59), contact quality (β=0.22), and impact on social infrastructure (β=-0.16, lower perceived impact associated with higher trust). The influence of the quantity of contact was not significant.

FIGURE 2. INTEGRATIVE MODEL PROPOSED BY MOFFAT AND ZHANG (2014)



Note: block lines represent statistically significant relationships, dasshed lines represent statistically non-significant relationship. Beta weights (standardized regression coefficients) represent the strength of relationship between variables, with positive number a indicating positive and vice versa. Values above trust and acceptance and approval represents the variance explained.

Their results showed that contact quality and procedural fairness played crucial roles in gaining and maintaining a SLO. Conversely, most mining companies focus on social infrastructure to mitigate the negative impacts of their operations. In other words, many mining companies attempt to buy trust from the local community. Instead, it is more effective to focus on creating a relationship with community members and include them in the company's decision-making process. For example, the study mentioned one oil company that spent USD 7 million per year on community programs but was unable to obtain community goodwill. As a result, the oil company consistently faced interruptions from the communities they work with (Moffat and Zhang 2014).

Mining companies have a significant impact on the economy and the environment in which they operate. However, the economic and environment impact of mining on SLO levels have not been adequately studied. To fill this literature gap, Cruz et al (2020) tested the following hypotheses on the Brazilian S11D mining project:

(i) Whether the procedural fairness and company-community interactions directly and positively influenced trust in the company and the project.

(ii) Whether economic and environmental impacts directly and negatively affect trust, acceptance, and approval, whereas social infrastructure – defined as the availability of health and education facilities, housing affordability, infrastructure for mobility and flow of merchandise, people and vehicles improvements directly and positively affect trust, acceptance and approval (Cruz, et al. 2020).

They also employed path analysis to assess the relationship between the variables and found the following: Procedural fairness (β=0.54, p=0.00) and company-community interactions (β=0.13, p=0.014) have a significant positive effect on trust. The perception of negative economic impact did not directly predict community trust in the company (β=-0.01, p=0.89) but significantly affected acceptance and approval (β=-0.17, p=0.01). There was a positive effect and significant effect between improvements in social infrastructure and trust (β=0.12, p=0.03). Although, improvements in social infrastructure did not significantly influence acceptance and approval (β=0.07, p=0.42). The relationship between environmental impacts and trust was negative and significant (β=-0.20, p=0.00) as was the relationship between acceptance and approval and environmental impacts (β=-0.28, p=0.00). Lastly, they also confirmed trust as a strong and significant predictor of acceptance and approval of the company and mining project (β=0.36, p=0.00).

These studies provided a theoretical basis on levels of SLO, the factors that influence whether a company can obtain a SLO as well as broader economic and environmental impacts of a mining project on SLO. Building on this strong theoretical basis, we will look into commonly applied methodologies used to evaluate SLO.

3. Evaluation of SLO and application of methodologies

The way to maintain a SLO is to continuously assess the community's attitudes towards a mining project and other influencing factors based on the literature and practices of mining dependent countries. Robinson (2020) assessed the SLO of mines in the Western Australian according to the following pillars:

- Social Impact Assessment (SIA)
- Social Acceptance Survey (SAS)
- Social Media and
- Protesting and Blockading

This section discusses how each of these pillars is used to evaluate the SLO. However, as the most important tool to evaluate the level of SLO is the social acceptance survey, it will be the focus of the section.

3.1. Social Impact Assessment

SIA emerged as a regulatory responsibility imposed by many governments and international financial institutions in the latter half of the twentieth century (Harvey and Bice 2014). SIA generally includes measures of the social and economic impacts generated by mining on service provisions, infrastructure and housing availability, socio-economic wellbeing (i.e., welfare, unemployment rates, % of low-income households), and the reliance of mining companies on non-residential workforce (Robinson , Fardin and Boschetti 2020).

Studies conducted in Western Australia have shown significant differences in methodology. Some studies relied solely on census data from the Australian Bureau of Statistics, and therefore did not include any direct participation while other studies included workshops, surveys interviews with stakeholders and individuals in the local community (Robinson , Fardin and Boschetti 2020). However, most surveys did not actively involve public participation in the evaluation and decision-making process of the mining project. Therefore, the evaluation showed a low level of public participation in the SIA of the Western Australia mining sector.

In Mongolia, SIAs have been conducted for large mining projects such as Oyu Tolgoi (OT) (2009) and Gatsuurt Gold Mine (2016). Oyu Tolgoi, in the South Gobi region of Mongolia, is one of the largest known copper and gold deposits in the world. Gatsuurt Gold is a planned open-pit mining site in Mongolia located about 110 kilometers north of the capital Ulaanbaatar in Mandal sum of Selenge province in northern Mongolia. These SIAs assessed the impact of mining projects on:

TABLE 1. POTENTIAL IMPACTS ASSOCIATED WITH A MINING PROJECT

OT project:	Gatsuurt Gold Mine:
• Local economy, business development and infrastructure • Population growth • Employment • Health and safety • Education • Cultural heritage • Social-economic issues of environmental impact • Land, pasture, and water supply Public services, security, crime and resettlement	• Demography • Social structure • Economy • Employment • Social infrastructure • Land use and natural resources • Community health, safety and security • Cultural heritage

OT's SIA covered 5 soums located in Umnugovi province: Dalanzadgad, Tsogttsetsii, Manlai, Bayan-Ovoo, and Khanbogd. Meanwhile, Gatsuurt Gold Mine's SIA covered Mandal soum, Bayangol soum and Tunkhel bagh located in Selenge province.

These SIA surveys included a household questionnaire, key informant interviews (KIIs) and focus group discussions (FGDs) for primary data collection and analysis. KIIs and FGDs with local citizens, soum officials, business owners, and civil society representatives were used to explore socio-economic themes in further detail. A large amount of secondary data was also collected and analyzed to describe the current socio-economic conditions of the project areas.

TABLE 2. DATA COLLECTION METHODOLOGY

OT project:	Gatsuurt Gold Mine:
• *Group discussion* • *Interview* • *Secondary data* • *Extrapolation ratio method*	• Household questionnaire • Key informant interview • Focus Group Discussion • Secondary data

Overall, while SIAs have not been used extensively in Mongolia, they have been conducted on large mining projects. However, a social acceptance survey, the most important tool in the evaluation of SLO, has not been conducted on any project in Mongolia. This is likely due to a lack of information as most mining companies do not have a comprehensive understanding of SLO. In light of its importance, the rest of the guideline will be focused on social acceptance surveys.

More about SIA can be found here: Joyce and MacFarlane (2001), Social impact assessment in the mining industry: Current Situation and Future Direction, Mancini, and Sala (2018), Social impact assessment in the mining sector: Reviews and comparison of indicators frameworks.

3.2. Social Acceptance Survey

The most important and widely used tool when evaluating SLO is the Social Acceptance Survey. The Social Acceptance Survey measures the impact and benefits of mining operations as well as the level of trust, the acceptance of an operation and interaction quality between community members and a mining company. Studies on the social acceptance and approval of mining operations have been used as an avenue for understanding and measuring SLO.

From 2009 to 2012, Thomson and Joy developed a set of 26 agree/disagree declarative statements centered around the theoretical elements of SLO. They included items on legitimacy, credibility, and trust as well as straightforward declarations endorsing the levels identified by Thomson and Joyce (i.e., “My organization accepts the project”, “My organization supports the project”). The items also included several statements based on the perceptions of stakeholders that Thomson and Joyce had observed as characterizing different levels of the social license, including some negatively keyed statements. These were worded so that agreement meant a lower social license score (e.g., “The company hides information from us”).

The items were presented to stakeholders in an agree/disagree format using a 5-point rating scale ranging from strongly disagree to strongly agree. The interviewees included stakeholders at mining projects in Australia, Bolivia, and Mexico. However, the negatively worded statements confused stakeholders such that they frequently gave the opposite response from what they meant. Therefore, to ensure accurate responding, all the statements should be positively worded.

Thomson and Boutilier (2011) aimed to measure the SLO level using a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). They tested a revised set of 15 items, which according to their analysis loaded on four latent factors: economic legitimacy, socio-political legitimacy, interactional trust, and institutionalized trust (Gehman, Lefsrud and Fast 2017). Using these factors, researchers can assess the level of SLO.

TABLE 3. QUESTIONS FOR MEASURING SOCIAL LICENSE (THOMSON AND BOUTILIER 2011)

Item	Statement
1	We can benefit from a relationship with the company
2	We need the cooperation of the company to reach our most important goal
3	The company keeps its promises
4	We are very pleased with our relationship with the company
5	The presence of the mining project is a benefit to us
6	The company listens to us
7	In the long term, the project will contribute to the well-being of the whole region
8	The company respects our way of life
9	The company treats everyone fairly
10	Our group and the company have a similar vision for the future of the region
11	The company gives support to those who it negatively affects
12	The company shares decision-making with us
13	The company's decisions are fair and take into account our interests
14	The company concerned about our interest
15	The company openly shares information that are relevant to us

Source: Thomson and Boutilier (2011)

The average of the measures indicates the degree of SLO (Table 4). Mining companies can use the 15 items above to conduct a survey to determine their level of SLO.

TABLE 4. SLO LEVELS AND SCORES

Level	Score
Identification	4.5-5.0
Approval	4.0-4.49
Acceptance	2.5-3.99
Withdraw	1.0-2.49

Source: Adapted from Thomson and Boutilier (2011)

In another social acceptance survey, Moffat and Zhang (2014) surveyed over a hundred members of the local community near a coal seam gas project in Australia twice, one year apart, to determine the project acceptance level. The survey covered the following topics:

1. Impacts on social infrastructure (e.g., medical, health, housing)
2. Contact quantity
3. Contact quality (i.e., pleasantness)
4. Procedural fairness (i.e., whether the company listens, allows participation in decision)
5. Trust
6. Acceptance and approval

Each pillar includes several sub-items in agree/disagree format using a 5-point rating scale from strongly disagree to strongly agree. A total of 123 residents who lived in areas affected by an Australian coal seam gas (CSG) operation and not employed in the CSG industry were included in the survey. Participants were recruited using a stakeholder database provided by a CSG company to the researchers for this study.

TABLE 5. *SURVEY MEASURES OF MOFFAT AND ZHANG (2014)*

SLO variables	Topics of the questionnaire
Impacts on social infrastructure	1. Housing availability 2. Housing affordability 3. Access to medical and health facilities 4. Access to community facilities
Contact quantity	1. Contact frequency in formal situations 2. Contact frequency in informal situations
Contact quality	1. How pleasant with personnel from the company 2. How positive with personnel from the company
Procedural fairness	1. Whether participate in decision-making process 2. The company listens to us 3. The company concerns our interest
Trust	1. I trust the company to act responsibly 2. I have goodwill/confidence/trust toward the company
Acceptance and Approval	1. I accept the company 2. I approve the company

Source: Moffat and Zhang

They used path analysis[1] to check the relationship between variables and in their hypothesis, the model specified impact on social infrastructure, contact quantity, contact quality, and procedural fairness as exogenous predictors of trust. Trust, in turn, was specified as predictor of acceptance. In addition, impact on social infrastructure served as an exogenous predictor of acceptance. They also allowed for correlation between the four exogenous predictors. They assessed the goodness-of-fit of model by the chi-square test, the Normed Fit index (NFI), and the Root Mean Square Error of Approximation (RMSEA). A non-significant chi-square test, CFI ≥ 0.95, NFI ≥ 0.95, and RMSEA ≤ 0.06 indicated a satisfactory fit.

There are also studies that assess the SLO level of a country's mining sector. For instance, Australia is one of the countries that have and implement measures to maintain a social license to operate. Moffat and others examined the attitudes of citizens in mining area based on a social acceptance survey in 2014 and 2017. Overall, they surveyed 8020 Australians chosen from 11 different regions about their attitude towards the mining sector. The survey consisted of three sub-sections that cover the benefits of mining, the negative impacts of mining, and fairness, confidence in governance and trust. Each section included several items measured on a scale from strongly disagree to strongly agree. For instance, the benefit of mining is assessed by 10 criteria scaled from 1 (strongly disagree) to 7 (strongly agree). The survey results were compared by mining and non-mining regions, and metropolitan and local areas (Moffat, Mccrea, et al. 2017).

3.3. Social media

Social media platforms have become a powerful tool to draw attention to social and environmental problems in the mining sector. Stakeholders have used social media as a way to undermine the mining company's social license. In Western Australia, for example, the local community has used social media in Port Headland to express their concern about BHP's mining operations. It also differs from traditional media as information can be communicated by anyone, is relatively uncensored and can be shared among individuals, groups, and networks at high speed.

Mining companies have started to recognize the impact of social media revolution on public perception and business. Consequently, mining companies utilize social media to advance community engagement and other socially and ecologically "responsible" activities, as well as providing "transparency" after mine site problems and failures (Kirschke 2013).

More about social media: Chang Xu et al (2020), Assessing social license to operate from the public discourse on social media, Robison et al (2020), Clarifying the current role of a social license in its legal and political context: An examination of mining in Western Australia

[1] See Appendix 1

3.4. Protesting and Blockading

When a community resists business projects and developments via protesting and/or blockading, this is an indicator of weakening social license. Therefore, protesting and blockading should be included in an assessment of SLO. Protests are one of the most powerful levers that communities can use to express their concerns and signal there is no social license. For companies, protests are warning signs as well as an opportunity to enhance their social license to operate. When companies identify community concern early, their social license can be enhanced.

More about protesting and blockading: Vanclay and Hanna (2019), Conceptualizing company response to community protest: principles to achieve a social license to operate, Robison et al (2020), Clarifying the current role of a social license in its legal and political context: An examination of mining in Western Australia

4. Conducting a social acceptance survey

A social acceptance survey should be conducted in cooperation with professionals or consulting companies. However, mining companies or those who are planning to conduct the survey should be aware of the survey methodology. In this section, we describe how the social acceptance survey can be conducted and what steps are followed. When conducting a sample survey, you must first determine the design of your survey, and in this section, we will look at how to decide on the sample size, sampling methods, and what research tools will be used to collect data. The sample survey generally consists of three parts, including (1) the preparation stage, (2) the data collection and entry stage, (3) the final stage. During the preparation stage, the survey budget and workforce will be determined, and the sampling methodology will be finalized. During the data collection and entry stage, the survey route to collect data for analysis is developed. The final stage is to analyze the data and prepare a report. The following sections describe the above stages in more detail.

4.1. Survey design

The general design of the survey is the **perception and repeated study**. In a perception study, the study is trying to find out how people understand or feel about their situations or environments. Meanwhile, a repeated study means that the social acceptance survey is repeated to check how the level of SLO changes over time. Depending on how the second survey is conducted, the survey will be repeated as a cross-section or panel.

- Repeated cross-sectional surveys ask the same questions (or the same “core” questions) over time but use a new sample of units at each repetition. Data from such surveys are used if the research question is on temporal changes with certain groups such as, for example, the wellbeing of employed and unemployed people.

- Panel surveys ask the same questions several times from the same sample unit. In the example, one may be interested in the casual effects of unemployment on wellbeing, i.e., the change in wellbeing due to becoming unemployed (Lipps 2021).

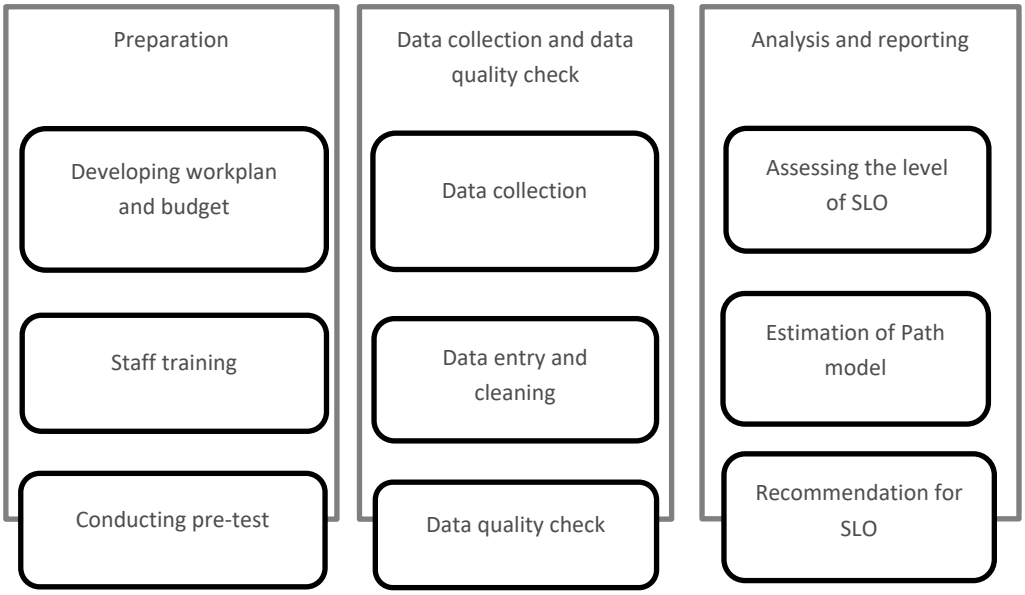
Repeated cross-sectional surveys give good estimates for the current population and any changes. On the other hand, while panel surveys are better suited to describing individual dynamics and conducting causal analyses, they are also more costly than repeated cross-sectional surveys and require considerable efforts to keep data quality high.

Sample size. The survey sample is a sample for interview using a questionnaire. Respondents of the questionnaire must be 18 years or older and the methodology for calculating the sample size is shown in Appendix 2. If the number of people living near the mining project is small, it is optimal to study the whole population to avoid sampling problems (e.g., selection bias). However, when the population is large, it is optimal to conduct a sample survey. Sampling is a method that allows researchers to infer information about the population based on results from a subset of the population, without having to investigate every individual. Reducing the number of individuals in a study lowers the cost and workload associated with a study and may make it easier to obtain high quality information. However, these benefits have to be balanced against having a large enough sample size with enough power to detect a true association.

Sampling methods. There are several different sampling techniques available that can be divided into two groups: probability sampling and non-probability sampling. The social acceptance survey must use probability sampling, which leads to higher quality findings because it provides an unbiased representation of the population. On the other hand, non-probability sampling does not represent the population. The main types of probability sampling are simple random sampling, systematic sampling, stratified sampling, and clustered sampling. Each method has its own advantages and disadvantages. The most suitable sampling techniques for conducting the social acceptance survey in Mongolia may be systematic sampling/random walk. There are many useful guidelines and handbooks on sampling methodology both in English and Mongolian (Etikan and Bala 2017, NSO 2018a, Ariunbold 2018, NSO 2018b).

The survey stages. As illustrated in the figure below, the survey comprises of three stages: preparation stage; data collection and data quality checking stage; and data analysis and reporting stage.

FIGURE 3. SURVEY STAGES



4.2. Survey preparation

4.2.1. Developing the workplan and budget

Workplan. For the survey to yield the desired results, there is a need to pay particular attention to developing the workplan. Developing the workplan depends on many things, such as sample size, workforce, budget, and duration of the survey. However, the most important thing in developing the workplan is choosing right time to start sampling. In particular, it is crucial to consider the political and social situation when choosing a time to start collecting samples. If the survey is conducted during an election or an economic crisis, the result could be significantly biased. This is because public perceptions are very sensitive to current social circumstances. Response biases can have a large impact on the validity of survey questionnaires. Therefore, it is important to take overall social circumstances into account when selecting the timing of the survey.

Budget. The survey budget indicates the financial requirements of the survey to be conducted. The budget is necessary to support and guide the implementation of the survey and the construction of the timetable for producing the survey results. Cost estimates must be as detailed as possible. It is therefore necessary to understand all the detailed steps involved in the survey operation (United Nations 2005). In general, the survey budget depends on the followings:

- Workforce number
- Planned time
- Staff cost

- Transport and travel cost

Number of researchers to work. As mentioned above, estimating the number of employees needed is important when estimating the budget and preparing the detailed workplan. The principal people involved in completing the assignment include:

- The core research team; and
- The project support staffs

The core research team's responsibilities include developing operational plans for every activity from pre-testing to data entry checks and data analyses, report development and editing.

The project support staff consists of the field survey teams and the data entry team. The support staff are responsible for contacting the respondent, collecting data, documenting the data collection process, entering, and cleaning data, and reviewing the process. One support staff interview an average of 8 people per day, so the number of staff working in the field will depend on the size of the sample.

4.2.2. Staff training

Before conducting the survey, the company must devote time to training staff to perform their tasks. The purpose of the training is to familiarize staff with the procedure of the data collection and data entry as well as their task assignments in order to collect data of the highest possible quality. The process of training researchers can be divided into the following two stages:

- Preparing a guide for researchers. By preparing the guide for researchers, team members have the same understanding of the work and have the advantage of avoiding any misunderstanding or risks.
- To organize training. The main purpose of the training is to explain the purpose and features of the study to the researchers, to train them to enter complete information from the participants using approved guidelines, to enter the collected information correctly.

4.2.3. Conducting a pre-test

The pilot survey is a miniature version of the survey and the data entry process. In the pilot survey, the researchers send out a questionnaire to a smaller sample size compared to the actual target audience. By collecting information from a convenient sample, it is possible to predict the response patterns of participants and make any required changes to the survey.

4.3. Data collection, data entry and data quality check

4.3.1. Data collection

Methods of collecting survey data and survey tool. There is a wide range of methods available for collecting data. The four main methods of collecting survey data are:

- **Online survey:** Online surveys are the most cost-effective and can reach the maximum number of people in comparison to other methods. This data collection method is much more widespread than other methods. Online surveys are also safe and secure to conduct. As there is no in-person interaction or any direct form of communication, they are useful in times of global crisis such as the COVID-19 pandemic.
- **Face to face interviews:** Face-to-face or personal interviews are very labor intensive but can be the best way of collecting high quality data. Face-to-face interviews are preferable:
    i. When the subject matter is very sensitive, but not personal,
    ii. If the questions to be coded are very complex or
    iii. If the interview is likely to be long

  Overall, face-face interviews are more expensive than other methods, but they can collect more complex information and are also useful when the subject matter is not of great personal interest to the respondent who would be unlikely to complete a postal questionnaire (Mathers, Fox and Hunn 2007).

- **Telephone interviews:** Telephone interviews can be a very effective and economical way of collecting quantitative data, particularly if the individuals in the sampling frame can all equally be accessed via telephone and if the questionnaire is short enough. Telephone interviews are particularly useful when the respondents to be interviewed are widely geographically distributed, but the complexity of the interview is limited. The length of a telephone interview is also limited, although this will vary with subject area and motivation (Mathers, Fox and Hunn 2007).
- **Paper survey:** The other commonly used survey method is a paper survey. These surveys can be used where laptops, computers, and tablets cannot be used. This method helps collect survey data in filed research that can be checked for validity.

The selection of the appropriate method depends upon several factors, including (Mathers, Fox and Hunn 2007):

- Access to potential participants/respondents
- The literacy level of respondents
- The subject matter
- The motivation of the respondents
- Recourses

Questionnaire. A questionnaire is a series of questions that are asked of survey participants. These questions are typically a combination of close-ended and open-ended questions. Section 3.2 includes examples of the questions that were used in this type of study. In the Appendix 3, we include questions used by Moffat and Zhang (2014). The key to using this questionnaire is the successful adaptation of some questions to the Mongolian context.

A survey of Erdenes Silver Resources' social approval showed that it is important to work on the questionnaire items depending on the specifics of the area. For example, Moffat and Zhang (2014) measured the impact of a mining company on housing availability and housing affordability in determining the impact of social infrastructure. Since it is not appropriate to include these two factors in Mongolia's rural context, we tried to determine how the mining company affects energy supply, water resources, and roads. However, rural households in Gurvansaikhan soum were not connected to electricity at all. Therefore, the company did not know how its operations affected the soum's energy supply.

In-depth interview questions. An in-depth interview is an open-ended, discovery-oriented method to obtain detailed information about a topic from a stakeholder. In-depth interviews are a qualitative research method. Their goal is to explore a respondent's point of view, experiences, feelings, and perspectives in depth. These types of interviews are often conducted at the beginning of a larger research project when there are questions about how to narrow the focus of the research, or what questions need to be explored through the research.

It is not necessary to obtain a random sample or get representative results from in-depth interviews and, in some cases, there may be very few people who meet the eligibility criteria. In the social acceptance survey, you should interview society organizations, community leaders, local administration, and local business. As an example, some questions are included in Appendix 4.

More about conducting in-depth interviews: https://www.wallacefoundation.org/knowledge-center/Documents/Workbook-E-Indepth-Interviews.pdf

Questions and topics for group discussions. A focus group discussion (FDG) is a good way to gather people from similar backgrounds or experiences together to discuss a specific topic of interest. The group of participants is guided by a moderator who introduces topics for discussion and helps the group to participate in a lively and natural discussion amongst themselves.

FGDs can be used to explore the meaning of survey findings that cannot be explained statistically, the range of opinions/views on a topic of interest and to collect a wide variety of local terms. As an example, some questions are included in Appendix 4.

More about conducting focus group discussion: https://www.eiu.edu/ihec/Krueger-FocusGroupInterviews.pdf

In-depth interview and focus group discussions gather qualitative data. Qualitative data is more difficult to analyze than quantitative data as it consists of text rather than numbers. Common approaches to analyzing qualitative data include:

- Qualitative content analysis: Tracking the occurrence, position and meaning of words or phrases.
- Thematic analysis: Closely examining the data to identify the main themes and patterns
- Discourse analysis: Studying how communication works in social context

4.3.2. Data entry and cleaning

In case of conducting a paper survey, data entry into a digital format is a necessary step. To ensure the quality of datasets, first, the data from the questionnaires should be typed into the database and second, the errors should be manually checked and identified using the paper original.

During and after the data entry process in every phase, the datasets must be checked for accuracy and consistency and corrected or deleted as necessary. The core research team will be responsible for cleaning the entered data to improve data quality (e.g., reading through a set of data, verifying accuracy, detecting, and correcting inaccurate information from the database).

During data cleaning, typing and spelling errors will be corrected, mislabeled data will be properly labeled and filed, and incomplete or missing entries will be completed.

4.3.3. Internal quality monitoring

Several internal quality checks and controls should be performed frequently at every stage of the survey. The aim of employing different types of internal checks is to ensure the best data quality and allow for timely and appropriate intervention if the survey is not adhering to the required quality.

Self-assessment checklist. The researchers have to complete a short checklist in the field before and immediately after the questionnaire is administered. This ensures that the researcher has recruited the correct respondent, followed the sampling plan, and selected effective questions.

Content check by field supervisors. The company should employ an on-site management of enumerators that is sufficient to observe the activities of the interviewers, identify problems in their administration of the questionnaires, and correct any issues that arise. The core research team will do selective checking of entered data, comparing entered information with the original paper surveys.

Manual check. A manual check should be implemented as no automatic predictions are perfect. A manual check is a way to catch errors by comparing a portion of the entered data to the data on the hardcopy questionnaire. These errors will then be fixed.

Analytical check. The research coordinator will check the dataset and run some basic analyses such as duplicate analysis, precision control, linearity, and comparison analyses. This will ensure all data is checked and free from any quality problems.

4.4. Data analysis and reporting

In the final stage, the research team will assess the level of SLO and prepare recommendations for mining companies on what to consider when trying to improve SLO.

4.4.1. The assessment of SLO

The following analyses should be performed in the study.

Descriptive analysis. First, the descriptive statistics need to be calculated. This will show the general trend of the variables. The following descriptive statistics can be calculated:

1. Measures of Frequency: Count, Percent, Frequency
2. Measures of Central Tendency: Mean, Median and Mode
3. Measures of Dispersion or Variation: Range, Variance, Standard Deviation
4. Measures of Position: Percentile Ranks, Quartile Ranks

Each variable ("Impact on social infrastructure", "Contact quantity", "Contact quality", "Procedural fairness", "Trust", and "Acceptance") is evaluated by two to four items/questions. The items will be averages and indicate the level of the variables. For instance, acceptance will be measured with two items and these two items will be averaged to indicate the level of SLO.

Cross analysis or comparison. After the descriptive statistics are calculated, cross analysis is performed. Cross tabulation is a method to analyze the relationship between multiple variables. For instance, whether the level of SLO differs depending on occupation and gender of the respondents.

Cross analyses are used to examine relationships within data that may not be readily apparent. Cross tabulation is especially useful for studying market research or survey responses. Cross tabulation of categorical data can be done through tools such as SPSS, SAS, and Microsoft Excel.

After performing the above analyses, the relationship between the main variables will be evaluated using path analysis. Recently, this analysis has been performed widely on social acceptance surveys (e.g., Moffat & Zhang 2014, Zhang et al 2017). The next section will detail how path analysis can be conducted on various statistical programs.

Integrating quantitative and qualitative study results. This "mixed method[2]" of research allows for the identification of the convergences and divergences between qualitative and the quantitative data that ultimately produces results that complement each other (Santos, et al. 2017).

[2] Mixing of quantitative and qualitative data within a single investigation of sustained program of inquiry

Repeated study. All analyses performed in the first study will be performed in the second study. The second survey will allow for a comparative study on how the level of SLO changes over time. Different analyses will be performed depending on the repeated cross-section or panel survey. For instance, a panel survey allows for descriptions of individual dynamics and is useful for conducting causal analyses.

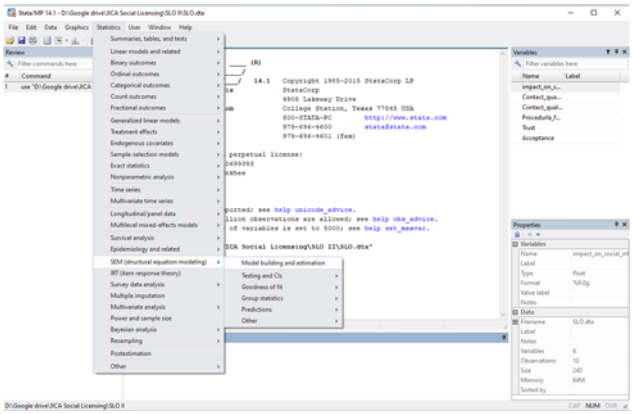
4.4.2. Estimation of the path model

Path analysis will be used to examine how the "Impact on social infrastructure", "Contact quantity", "Contact quality", and "Procedural fairness" affect "Trust", and "Acceptance". More specifically, the path model will specify the impact on social infrastructure, contact quantity, contact quality, and procedural fairness as exogenous predictors of trust. Trust will be specified as a predictor of acceptance. In addition, impact on social infrastructure will serve as an exogenous predictor of acceptance.

Path analysis can be conducted with statistical programs including SPSS and STATA. Therefore, we have selected STATA 14 and briefly explained how to perform the path analysis.

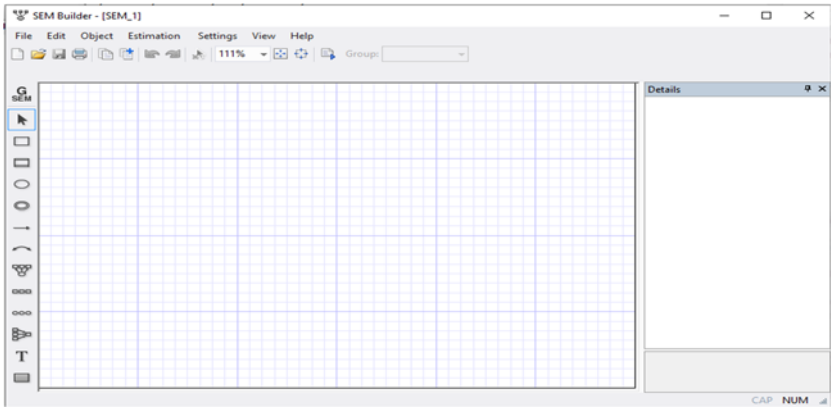
To perform the path analysis, we need to select **Statistics** > **Sem (structural equation modeling) > Model building and estimation**.

FIGURE 4. MODEL BUILDING AND ESTIMATION



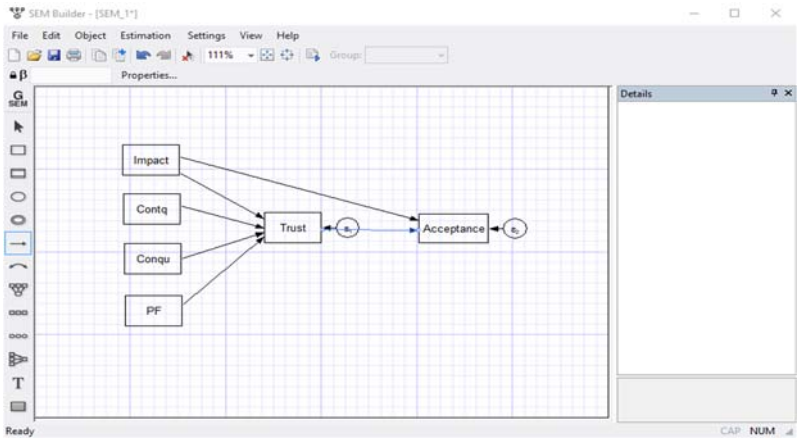
Selecting the above option will bring up the following window. In this window, we need to draw the path model.

FIGURE 5. SEM



The arrow pointing from "Variable A" from "Variable B" shows that "Variable A" is an exogenous predictor of "Variable B". The model shown in Figure 1 will be drawn in this window.

FIGURE 6. THE PATH MODEL



After drawing the path model, we select **Estimation > Estimate** to estimate the model.

The goodness of fit of the model will be assessed using the chi-square test, the comparative fit index (CFI), normed fit index (NFI), and root mean square error of approximation (RMSEA). A satisfactory fit is indicated by a non-significant chi-square test, CFI ≥ 0.95, NFI ≥ 0.95, RMSEA ≤ 0.06 (Kenny and McCoach 2003). We need to select Estimation > Goodness of fit > Overall goodness to check the goodness of fit of the model. This analysis will lead to the key conclusions on how the level of SLO can be improved. The model's standardized parameter estimates allow us to determine which predictor has the strongest effect on SLO. This will specify the predictors companies should focus on when trying to obtain a SLO.

4.4.3. Recommendation for the SLO

These concepts should be clearly separated in the formulation of conclusions and recommendations:

- The result: Information about the situation
- Conclusion: Evolution of information and data
- Recommendation: Recommended measure

Suggestions and recommendations must meet the following requirements, including:

- It is clear that it came from the data collected in the study
- Be feasible in practice.

Finally, a report will be prepared to summarize the analyses performed in this section.

5. Social acceptance survey case of Erdenes Silver Resource

This section details the social acceptance survey conducted at the Salkhit silver mine by the research team based on the guideline detailed above.

5.1. Salkhit project overview

The Salkhit silver mine is located in Gurvansaikhan soum of Dundgovi province. The license for the Salkhit silver mine was originally owned by China's JPF LLC. In October and November of 2018, the ownership shares of three individuals owned by JPF LLC were changed several times. However, these changes were not registered with the relevant tax authority. Therefore, on December 29, 2018, special intelligence, police and domestic military units led by G.Zandanshatar, the head of the Cabinet of Ministers, carried out a special operation in accordance with the instructions given by the Prime Minister and took the mine under state protection. The license issued to JPF LLC was revoked and was taken over by the Mongolian government.

FIGURE 7. SALKHIT PROJECT OVERVIEW

Source: Erdenes Silver Resource

Following the nationalization of the Salkhit silver mine, its license was granted to Erdenes Silver Resource LLC, a subsidiary of Erdenes Mongol LLC, in July 2019. As of 2020, the company has 108 full-time employees and 307 subcontractors. The exploration license covers an area of 28.8 thousand hectares, and as of 2020, the open pit reserves were determined as follows:

TABLE 6. SALKHIT SILVER OPEN PIT RESOURCES

Ore type	m^3	tons	Volume weight	Silver (gram/ton)	Gold (gram/ton)	Silver, (kg)	Gold, (kg)
Oxidized ore	28,998.11	75,105.12	2.59	215.15	0.22	16,158.98	16.36
Primary ore	632,824.22	1,689,640.65	2.67	330.28	0.44	558,050.05	738.31
Total	661,822.33	1,764,745.77		325.38	0.43	574,209.03	754.67

Source: Erdenes Silver Resource

In 2020, the Government of Mongolia obtained a loan from the Bank of Mongolia using the government's expected returns from the Salkhit silver mine as collateral. Using this loan, the Government of Mongolia rewarded pensioners who did not have outstanding pension-backed loans following the government's one-time cancellation of pension-backed loans on January 10, 2020. Within this scope, 194.1 thousand pensioners without pension-backed loans were disbursed MNT

194 billion and 43.9 thousand elders with less than MNT 1 million in loans were disbursed MNT 21.4 billion (Montsame 2021). These disbursements were financed by issuing securities as collateral for the government's return on the Salkhait silver mine. This project is responsible for repaying 1.2 trillion MNT in pension loans over five years.

A silver refinery was built in 2016 with a processing capacity of 300 thousand tons of ore per year. Between 2020 and 2021, the plant processed 196.9 thousand tons of ore and produced 2.8 thousand tons of concentrate. Furthermore, a concentrator with a capacity of 600 thousand tons of ore was planned to be commissioned in July 2021, but was not completed due to equipment delays, customs and freight issues caused by the COVID-19 pandemic. Due to these setbacks, there is little chance to repay the debt of MNT 1.2 billion by 2024.

5.2. Conducting social acceptance survey

The survey was conducted according to the methodology developed in "Guidelines for Social license to Operate for Local Mining Projects". The following section describes the methodology used and the problems encountered during the sample survey.

5.2.1. Data collection

Sample size

We conducted in-person interviews with 211 residents who live in Gurvansaikhan soum in Dundgovi province. The main unit of the sample were households and the methodology for calculating the sample size is shown in Appendix 2. Gurvansaikhan soum consists of 5 baghs and the sample size for each bagh was determined in proportion to the number of households in the bagh (Table). The sampling margin of error was approximately 5% with a confidence level of 95%.

***TABLE 7.** SURVEY SAMPLE BY BAGH*

Bagh		Number of households	Sample size
1	Elgen	121	38
2	Dersene us	181	57
3	Chuluut	137	43
4	Gurvansaikhan	124	39
5	Suugaant	109	34
	Total	672	211

Source: NSO, research team's calculation

Sampling method

We employed the systematic sampling/random walk method to collect data. In other words, we selected one out of every three household within the sample (pop/n=672/211) and surveyed one member (over 18 years old) of the selected household. At the time of our sampling, there were many occasions when households were absent as the new school year was approaching and the wedding season had begun. Therefore, the research team found that the sample survey should be conducted in a period of low migration when the social and political situation is stable.

Training staff

The sample survey team consisted of seven people, including 2 drivers and 5 researchers. We conducted a one-day training that covered the purpose of the survey, explanations of the survey questionnaire, and how to interact with people. Another issue to take into consideration was the number of researchers as well as the number of research equipment. In provinces located in the desert region of Mongolia, households are very spread apart, and it was rare to find a cluster of households when conducing the survey. Thus, each researcher needs to be provided with their own research equipment in order to be able to conduct the survey efficiently.

5.2.2. Procedures

Survey instruments (questionnaire and in-depth interview)

In this study, we conducted in-person interviews with 211 respondents employing a 34-item questionnaire in addition to conducting in-depth interviews with representatives of local civil societies, the local government, and local businesses. The questionnaire was adapted from Moffat and Zhang (2014) and generally consisted of two parts. The first part provided general information about participants while the second part included 24 questions that assessed the respondent's perceptions about the impact of mining on social infrastructure, contact quality and quantity with personnel from the mining company, procedural fairness, trust, and overall acceptance.

Impact on social infrastructure was measured with 6 items asking about the extent to which participants experienced impacts from the mining-related activities, relative to their expectations. 5 areas of impact were assessed, including: access to medical and health facilities, access to school and kindergarten, electricity supply, water supply (1=much worse than expected 3=not changed at all, 5=much better than expected). Participants' score was reversed and averaged, such that higher scores indicate a worse-than-expected impact.

Contact quantity was measured with two items adapted from Moffat and Zhang (2014). Participants were asked to rate how much contact they had with people from Erdenes Silver Resource at community meetings as well as any informal contact before the outbreak of the COVID-19 pandemic 1=none at all, 5=a great deal). Scores from the two items were averaged with the overall score indicating the frequency of contact with personnel from the Erdenes Silver Resource.

Contact quality was measured with two items adapted from Moffat and Zhang (2014). Participants were asked to rate how pleasant and how positive their contact with the personnel from Erdenes Silver resource were. Scores from two items were averaged, such that higher scores indicated a high quality of contact with personnel from Erdenes Silver Resource.

Procedural fairness was measured with three items adapted from Moffat and Zhang (2014). Participants were asked to rate the extent to which they agreed with the following statements: "People in your community have opportunity to participate in the decisions made by Erdenes Silver Resource", "Erdenes Silver Resource listens to and respects your opinions" and "Erdenes Silver Resource is prepared to change its practices in response to community sentiment". Scores from these three items were averaged such that higher scores indicated high perceived procedural fairness.

Trust was measured with four items adapted from Moffat and Zhang (2014). Participants were asked to rate the extent to which they "Trust Erdenes Silver Resource to act responsibly", "Trust Erdenes Silver Resource to do what is right", "Trust Erdenes Silver Resource to act in the best interest of society", "Trust Erdenes Silver Resource generally". Scores from four items were averaged, such that higher scores indicated greater levels of trust.

Acceptance was measured with two items adapted from Moffat and Zhang (2014). Participants were asked to rate how much they accepted/approved of Erdenes Silver Resource's operations in the region (1=not at all, 5=very much). Scores on these two items were averaged such that higher scores indicated greater levels of acceptance/approval.

Data analysis/integrative model

The research team calculated the bivariate correlation between each variable to assess whether they were correlated. Subsequently, a path analysis approach (a specific multiple regression) was employed to deeply examine the independent relationships between the variables. On the other hand, we tested whether the following hypotheses were true:

i. Negative impact on social infrastructure will negatively affect trust in the company and the acceptance of the mining operation.
ii. Contact quantity and procedural fairness will enhance trust in the company
iii. Trust in the company will have a positive relationship with acceptance and approval of the mining company

The goodness of fit of the model was assessed using the chi-square test, the comparative fit index (CFI), normed fit index (NFI), and root mean square error of approximation (RMSEA). A satisfactory fit is indicated by a non-significant chi-square test, CFI≥0.95, NFI≥0.95, and RMSEA≤0.06.

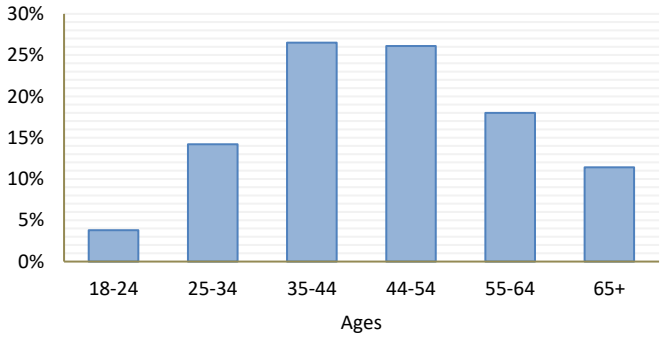
5.3. Result

5.3.1. Descriptive and cross analysis

Participants' profile

Of the 211 participants, 118 (55.9%) were male and 93 (44.1%) were female. The participants were evenly distributed between the ages of 18 and 89 (*Figure 8*), with an average age of 47.3 (male - 46.4, female - 48.4). Regarding education, 1.9% of the participants were uneducated, 20.9% had primary education, 22.75% had basic education, 35.1% had secondary education, 1.9% had technical and vocational education, 7.1% had specialized secondary education and 9.9% had higher education. In terms of employment, 87.2% of the respondents were employed and 12.8% were unemployed. The majority or 76.8% of the total employed were herders.

FIGURE 8. *PARTICIPANTS BY AGE*



Awareness

We rated the respondents' knowledge of Erdenes Silver Resources on a scale of 1 to 5, and 64% of the respondents rated themselves as unaware or very unaware (Figure 9). This indicates that the company did not establish any relationship with local people and does not provide information. However, it is worth noting that the company's operations started at the beginning of the COVID-19 pandemic. This may have led to a lack of opportunities for the company to communicate with the local community.

FIGURE 9. PARTICIPANT'S AWARENESS OF THE COMPANY

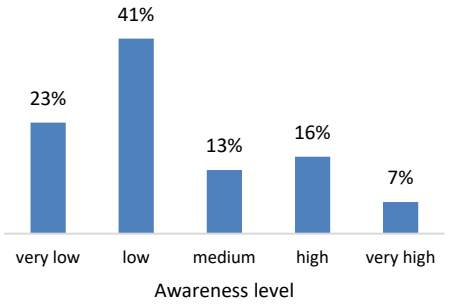
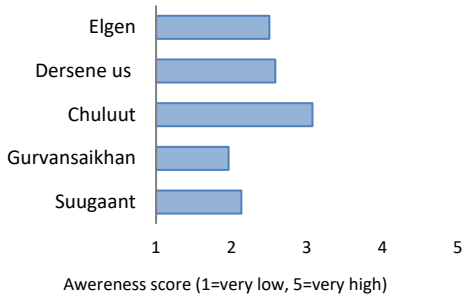


FIGURE 10. AWARENESS BY SUB-DISTRICT



Contact quantity and quality

Participants rated the frequency of contact with Erdenes Silver Resources an average of 1.2 points, and most participants answered that they had never met with the company's employees or representatives (**Figure 11**). As the local residents do not have any relationship with the company, most of participants could not determine how pleasant or positive their contact was (**Figure 12**). Therefore, due to the missing value of contact quality, it was not possible to include contact quality in the model.

FIGURE 11. FREQUENCY OF CONTACT WITH THE COMPANY

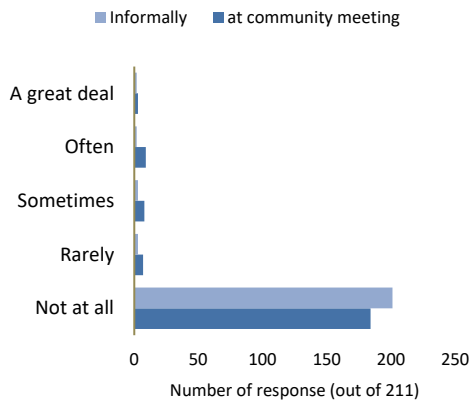
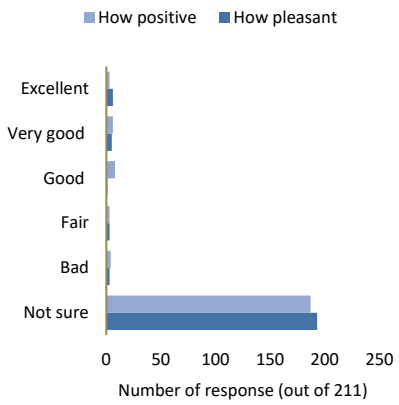


FIGURE 12. CONTACT QUALITY OF THE COMPANY



Box 1: Excerpts from in-depth interviews

… "Due to the outbreak of COVID-19 shortly after Erdene Silver Resources began operations, there hasn't been a chance for the company to organize a meeting with all local residents. They might have met one or two local residents in passing. Residents are interested in knowing more about what goes on at the mine" …

… "There are instances where local residents represent the community and monitor the mine and its surrounding areas. However, there are cases where holes have been dug and hydrogeological surveys were conducted without providing any information to the local community. For example, 15 to 16 holes were drilled but the soum environmental inspector wasn't informed" …

Impact on social infrastructure

We assessed the impact on social infrastructure with six items. The average score of these items was 2.95 points. This indicates that Erdenes Silver Resource had no major impact on the social infrastructure of Gurvansaikhan soum (1=much worse than expected 3=not changed at all, 5=much better than expected). Most respondents rated the impact on social infrastructure 3 points.

When conducting the sample survey, the research team noticed that the impact on social infrastructure differed greatly depending on local circumstances and who the respondent was. As we mentioned before, five areas were assessed, including access to medical and health facilities, access to school and kindergarten, electricity supply, water supply. For instance, very rural households are not connected to electricity, making it impossible to access whether the mining company's operations impacted electricity supply. This highlights the need to adjust questions based on local circumstances.

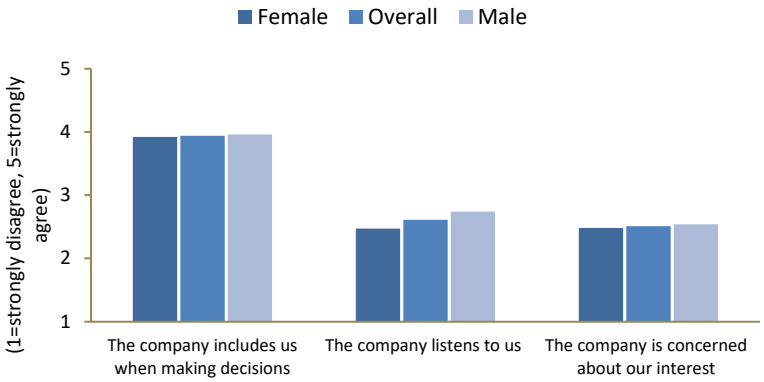
Box 2: Excerpts from in-depth interviews

… "From 2012 to 2019, the Chinese JPF LLC operated at the Salkhit silver mine. During this period, the private company worked with the local community to implement local infrastructure projects such as building wells and housing for the community. While Erdene Silver Resources provided rapid tests and PCR testing equipment during the COVID-19 pandemic, they did not implement any infrastructure projects targeted at the local community. Normally, companies create a tripartite agreement with the province and local authorities. However, no such agreements have been reached with the soum" …

Procedural fairness

Participants rated Erdenes Silver Resources with a score of 3.23 on whether they are respected and included in the company's decision-making process. However, the scores of the participants on the items only focused on the perceived procedural fairness of the company. For example, "People in your community have the opportunity to participate in the decisions made by Erdenes Silver Resource" was rated 3.9 points, "Erdenes Silver Resource listens to and respects your opinions" was rated 2.6 points and "Erdenet Silver Resource is prepared to change its practices in response to community sentiment" was rated 2.5 points (Figure 13). Thus, although local residents did not participate in the company's decision-making process, they valued the items highly because they believe that if they try to participate, it is possible to influence the company's decisions. To prevent this, questions should be as clear as possible and avoid words that can be misunderstood.

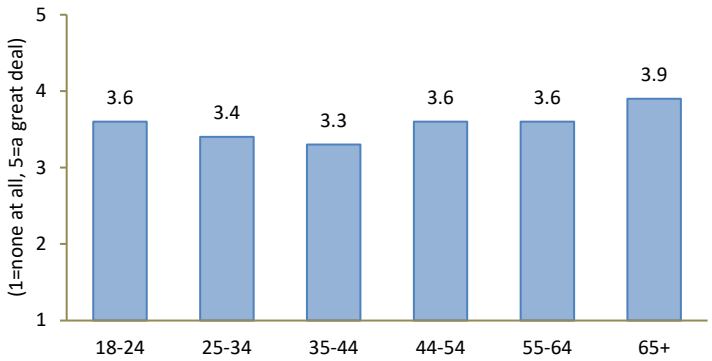
FIGURE 13. PROCEDURAL FAIRNESS BY THREE ITEMS



Trust

The participants' level of trust was 3.5 points. Although the company does not hold public meetings or provide information on its activities, the level of trust was above average. This may be due to the company's relation to the government's decision to cancel pension loans and the distribution of money to the elderly who do not have loans. This assumption is supported by the fact that the level of trust varies by age group with the level of trust among the elderly being higher than average. In addition, older people tend to trust the government more, which is evidenced by

FIGURE 14. LEVEL OF TRUST BY AGE



Acceptance and approval

THE PARTICIPANTS RATED THEIR ACCEPTANCE AND APPROVAL OF ERDENES SILVER RESOURCE 3.5 POINTS (

FIGURE 15). AS WITH TRUST, THIS FINDING WAS ALSO ABOVE AVERAGE. THOSE RESPONSES ARE ALSO NOT SIGNIFICANTLY DIFFERENT BY GENDER OF THE PARTICIPANT. HOWEVER, IT IS WORTH NOTING THAT THE ACCEPTANCE LEVEL OF THE DISTRICT CENTER AND THE SUB-DISTRICT WHERE THE COMPANY IS LOCATED WAS LOWER THAN OTHER SUB-DISTRICT (

FIGURE 16).

FIGURE 15. ACCEPTANCE AND APPROVAL

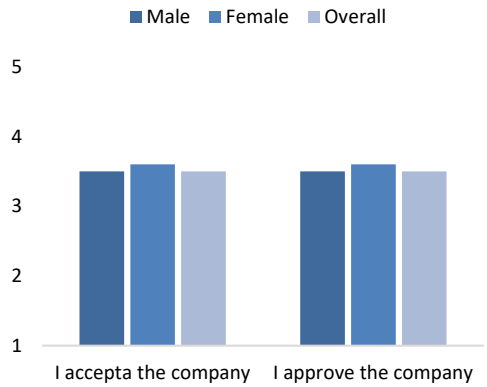
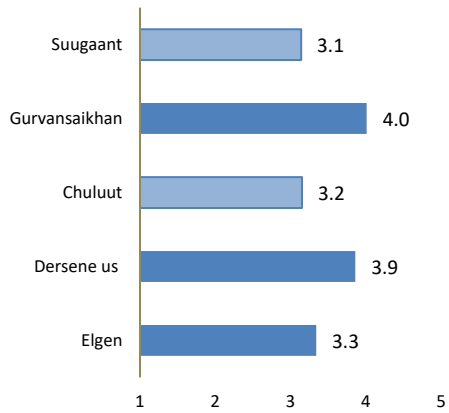


FIGURE 16. ACCEPTANCE AND APPROVAL BY BAGH



5.3.2. Integrative model

As previously mentioned, the research team calculated the bivariate correlation between each variable. According to the correlation matrix, trust and acceptance are significantly correlated to all factors. However, there is no significant relationship between the other factors.

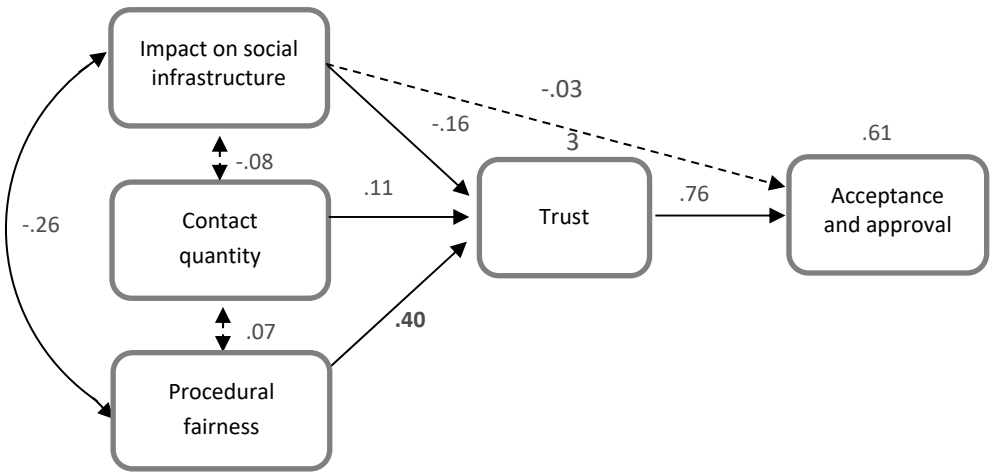
TABLE 8. *DESCRIPTIVE STATISTICS AND BIVARIATE CORRELATION*

	SLO Factors	M (SD)	1	2	3	4	5
1	Social infrastructure impact	3.05 (0.38)	1				
2	Contact quantity	1.20 (0.61)	-0.08	1			
3	Procedural fairness	3.24 (1.14)	-0.23	0.07	1		
4	Trust	3.51 (1.17)	-0.25***	0.16***	0.45***	1	
5	Acceptance	3.54 (1.34)	-0.20***	0.14***	0.37***	0.75***	1

***, **, * are significant at the levels of 1%, 5%, 10%

Participants who experienced an impact on social infrastructure reported lower levels of trust (β=-0.16, ρ=0.013), but this experience did not directly predict their acceptance of the company (β=-0.03, ρ=0.469). Participants who had a high frequency of meetings with company personnel reported higher levels of trust (β=0.11, ρ=0.07). Furthermore, participants who perceived that the company was procedurally fair in dealing with local communities reported higher levels of trust (β=0.40, ρ=0.00). Lastly, trust was a strong and significant predictor of acceptance and approval of the company and mining project (β=0.76, ρ=0.00). This model provided an excellent fit for the data with a non-significant chi-square value (chi(2)=0.608, p=0.738), indicating that the hypothesized covariance matrix did not differ from the actual covariance matrix. Other fit indices corroborated this evaluation of the model: CFI=1.000, NFI=1.022, RMSEA=0.000.

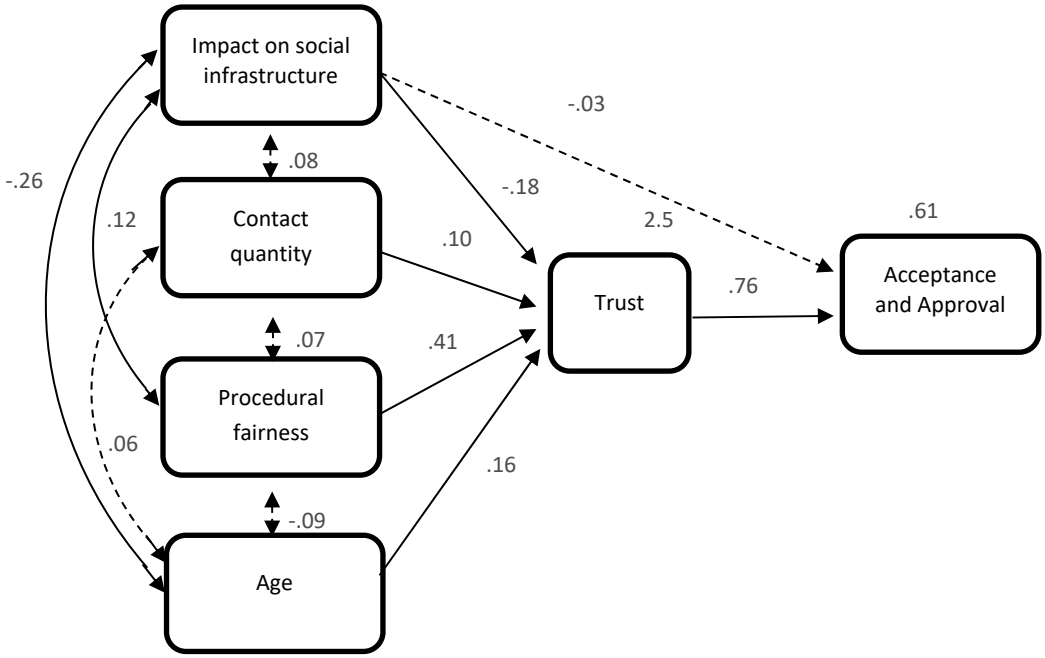
Figure 17. *Social license to operate path model – 1*



Note: block lines represent statistically significant relationships, dashed lines represent statistically non-significant relationship. Beta weights (standardized regression coefficients) represent the strength of relationship between variables, with positive numbers indicating positive relationships and vice versa. The values above trust and acceptance and approval represents the variance explained.

We included the age of the participants in the model to test how stable the model was. We saw that the older the participant was, the more they trusted the company. Therefore, we tried to validate this relationship. The model with age did not differ much from the previous model. The age variable has a significant positive effect on trust, indicating older people trust Erdenes Silver Resources more. The other variables are almost identical to the results of the previous model. This demonstrates that our model is very stable. This model also provided an excellent fit for the data with a non-significant chi-square value (chi (3) = 0.958, p = 0.811), indicating that the hypothesized covariance matrix did not differ from the actual covariance matrix. Other fit indices corroborated this evaluation: CFI = 1.000, NFI = 1.027, RMSEA = 0.000.

FIGURE 18. SOCIAL LICENSE TO OPERATE PATH MODEL – 1



Note: Block lines represent statistically significant relationships, dashed lines represent statistically non-significant relationship. Beta weights (standardized regression coefficients) represent the strength of relationship between variables, with positive numbers indicating positive relationships and vice versa. The values above trust and acceptance and approval represents the variance explained.

5.3.3. Discussion and Literature comparison

Our study results demonstrate broad support for the model of social license to operate proposed by Moffat and Zhang (2014). Frequency of contact with company personnel, procedural fairness and perceived impact on social infrastructure affect community acceptance and approval by increasing or decreasing trust in the company. To compare variables that impact trust, procedural fairness was the strongest predictor, impact on social infrastructure was second strongest predictor and contact quantity was the weakest predictor. However, contact quantity and impact on social infrastructure was not significantly different in terms of the power exerted on the trust.

Consistent with previous international studies (Moffat and Zhang, 2014; Thomson and Boutilier, 2011; Warhust, 2011), we confirmed trust as a strong and significant predictor of acceptance and approval of the company and mining project (β=0.76, ρ=0.00). Likewise, procedural fairness had a highest positive effect on trust, in line with Moffat and Zhang (2014) and Cruz et al (2020).

Contact quantity, which explains the importance of trust, differs from the results of Moffat and Zhang (2014). This may be due the exclusion of contact quality in our model. In particular, the results of Moffat and Zhang (2014) showed that contact quality and contact quantity were reasonably correlated (r=0.37), and that most of the trust variations were explained by contact quality. Therefore, contact quantity did not predict community members' trust directly. In our model, contact quality was not included due to missing values. As a result, contact quantity had a significant effect on community members' trust.

5.4. Recommendation for mining companies

The path analysis shows the importance of gaining community trust in order to garner community approval and acceptance for a project. In turn, trust in a mining company and its project is largely dependent on the perceived procedural fairness of the mining company's decisions. In other words, mining companies should focus on including the local community in their decision-making process and considering their opinions. Mining companies focus significant resources on improving local infrastructure, such as roads, and mitigating the negative effects of their operations through supporting local employment and other social investments. However, according to the results of our study, procedural fairness plays a larger role in determining local community trust than the impact of social infrastructure. This suggests that while improving local infrastructure is important, particular in Mongolia, it is unwise for mining companies to allocate all of their resources to improving social infrastructure.

Based on the study results above, Erdenes Silver Resource should consider the following in order to improve its SLO:

- The majority of survey participants did not have any formal or informal contact with any Erdenes Silver Resource personnel. While the COVID-19 pandemic made it difficult to organize any large formal meetings with local residents, it is possible to build relationships

and provide citizens with information through social media. However, rather than only focusing on increasing the contact frequency with the local community, it is more important to ensure that the contact is pleasant and positive.

- Trust levels varied by age group. The path analysis also supported the finding that older participants trusted the company more. Additionally, participants in the 24 to 44 age group displayed lower levels of trust in the company. Thus, it might be more effective for Erdenes Silver Resource to focus on younger residents when trying to improve overall trust levels.
- When conducting the sample survey, the research team noticed that a large portion of the local community was employed at the mine when it was operated by JPF LLC. When the mine was nationalized, many of the people employed there lost their jobs. While Erdenes Silver Resource promised to rehire former employees, this does not seem to be the case. On one hand, the rehiring of former employees is a form of supporting the social infrastructure. On the other hand, it is also a way to fulfill a previously made promise and support future communication with the local community through the employees.
- We assessed procedural fairness with 3 items. From these results, the questions “Erdenes Silver Resource listens to and respects your opinions” and “Erdenet Silver Resource is prepared to change its practices in response to community” received below average ratings. This indicates a need for Erdenes Silver Resource to establish better relationships with the local community and consider their opinions and suggestions when making decision.

5.5. Conclusion

We examined how the impacts on social infrastructure, contact quantity and trust affect the acceptance of a mining company and its operations. From the result, frequency of contact with company personnel, procedural fairness and perceived impact on social infrastructure affect community acceptance and approval by increasing or decreasing trust in the company. Furthermore, we confirmed trust as a strong and significant predictor of acceptance and approval of the company and mining project. Our findings are similar to Moffat and Zhang (2014) and other international studies.

Mining companies in Mongolia do not have a good understanding of SLO. As such, despite the increasing number of mining projects operating in Mongolia, a social acceptance survey has never been conducted before. In light of this, the research team hopes that this study will provide valuable information on the topic of SLO and be of some help to those conducting similar studies in Mongolia in the future.

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Appendices

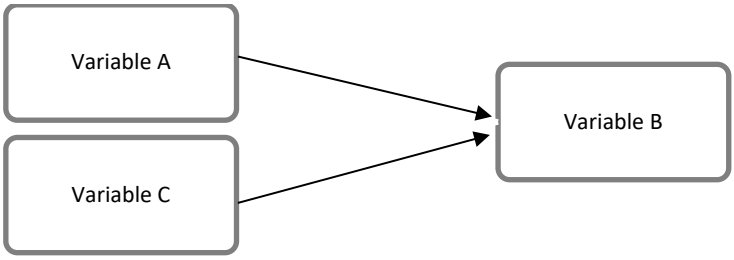
Appendix 1: Path analysis

Path analysis is a form of multiple regression statistical analysis that is used to evaluate causal models by examining the relationships between a dependent variable and two or more independent variables. By using this method, one can estimate both the magnitude and significance of causal connections between variables.

Path analysis is theoretically useful because it forces us to specify relationships among all of the independent variables. This results in a model showing causal mechanisms through which independent variables produce both direct and indirect effects on a dependent variable.

Typically, path analysis involves the construction of a path diagram in which the relationship between all variables and the causal direction between them are specifically laid out. When conducting a path analysis, one might first construct an input path diagram, which illustrates the hypothesized relationships. In a path diagram, researchers use arrows to show how different variables relate to each other. An arrow pointing from, say, Variable A to Variable B, show that Variables A is hypothesized to influence Variable B.

Example of path model:



Path analysis can be conducted with statistical programs including SPSS and Stata. The method is also known as causal modeling, analysis of covariance structures, and latent variable models.

Appendix 2: Sample size calculation

The sample size of the survey depends on the target population the survey aims to cover. The quantitative survey sample size is calculated using the following sample formula:

$$n = \frac{z^2 * p * (1-p)}{c^2} \qquad (1)$$

$z = Z$ value (e.g., 1.96 for 95% confidence level)

p= percentage picking a choice (.5 used for sample size needed)

c=confidence interval, maximum margin of error (e.g., .05 = ± 5%)

Correction for finite population:

$$new\ n = \frac{n}{1 + \frac{n-1}{pop}} \qquad (2)$$

To calculate sample size tentatively, you can just use online sample size calculators (for example, https://www.surveysystem.com/sscalc.htm)

Appendix 3: Sample questionnaire

Social acceptance survey

The survey is conducted by ….. (the research team/company) commissioned by …… ()
This survey aims to study the perception of the local community on the mining project/activities at …… (area).
The data gathered from this survey will only be used for research purposes and its confidentially will be protected under the Statistics Law of Mongolia and other related laws.

Survey information	Survey duration
Surveyor:	Start time: _ _: _ _
Survey ID:	End time: _ _: _ _

A. GENERAL INFORMATION OF RESPONDENTS

A1. Age:

A2. Gender:

A3. Household size:

A4. Education level:

1. None
2. Primary
3. Basic
4. Secondary
5. Vocational
6. Specialized secondary
7. Diploma
8. Bachelors
9. Masters and higher

A5. Do you work?

1. Yes 2. No ►A8

A6. What is your employment status?

1. Employed (paid)
2. Employed (unpaid)
3. Livestock
4. Agriculture
5. Other /specify/_____

A7. What is your organization type?

1. Partnership
2. Cooperative
3. Corporation
4. LLC
5. State Owned Company
6. Local Authority Owned Company
7. Government Organization
8. NGO

9. Other

A8. Reasons for unemployment

1. Student
2. Too old
3. Housework, taking care of children
4. Cannot find a suitable job
5. Sick/Cares for a sick person
6. Disabled
7. Other

A7. How much is your monthly household income? (Including all income sources such as wage, income from cashmere and other animal product sales, pension, and benefits. Convert annual incomes into monthly income.)

1. Less than MNT 500,000
2. MNT 500,000 – MNT 1,000,000
3. MNT 1,000,000 – MNT 1,500,000
4. MNT 1,500,000 – MNT 2,000,000
5. More than MNT 2,000,000

B. IMPACT ON SOCIAL INFRASTRUCTURE

Rate the extent to which you experienced impacts, relative to your expectations, over the past 12 months (1=much worse than expected, 5=much better than expected).

B1	Access to medical and health facilities	1	2	3	4	5
B2	Housing affordability	1	2	3	4	5
B3	Housing availability	1	2	3	4	5
B4	Access to community facilities (social services)	1	2	3	4	5

C. CONTACT QUANTITY

(1=none at all, 5=a great deal)

C1	How much contact do you have with people from [the company/project] at community meetings in your local area/overall social situation	1	2	3	4	5
C2	How much contact do you have with people from [the company/project] at events in your local area/overall social situations?	1	2	3	4	5
C3	How much contact do you have with people from [the company/project] informally in your local area/overall social situations?	1	2	3	4	5

D. CONTACT QUALITY

D1	How pleasant is your contact with the personal from [the company/project]? (1=very unpleasant, 5=very pleasant)	1	2	3	4	5
D2	How positive is your contact with the personal from [the company/project]? (1=very negative, 5=very positive)	1	2	3	4	5

E. PROCEDURAL FAIRNESS

Rate the extent to which you agree with following statements (1=strongly disagree, 5=strongly agree)

E1	People in your community participate in the decisions made by [the company/project].	1	2	3	4	5
E2	[The company/project] listens to and respects your opinions	1	2	3	4	5
E3	[The company/project] is prepared to change its practices in response to community sentiment	1	2	3	4	5

F. TRUST

Rate the extent to which you agree with following statements (1=none at all, 5=a great deal)

F1	I trust [the company/project] to act responsibly	1	2	3	4	5
F2	I trust [the company/project] to do what is right	1	2	3	4	5
F3	I trust [the company/project] to act in the best interest of society	1	2	3	4	5
F4	I generally trust [the company/project]	1	2	3	4	5

G. ACCEPTANCE

Rate the extent to which you agree with following statements (1=none at all, 5=very much)

G1	We accept [the company/project] operation in the region	1	2	3	4	5
G2	We approve of [the company/project] operation in the region	1	2	3	4	5

Appendix 4: List of interview questions for key informants and stakeholders

Questions for local civil society organizations and community leaders

1. Responsibilities and positions of the participants .....
2. How many years have you been in charge of this work? ....
3. How many years have you lived in the soum? ...
4. How much do you know about [the company/project]? Where and how do you get information?
5. How do you think the operation of [the company/project] has affected the lives of soum residents, soum health, access to education, energy, roads and other social infrastructure?
6. How do you think [the company/project] will affect soum and local development and people's lives in the future? Why?
7. How much impact is [the company/project] having on the local environment?
8. How much do you know about the company's social responsibility activities in your soum and local area? What work has been done and is being done?
9. What is [the company/project]'s relationship with local community? How do they work together? What initiatives has the company taken?
10. What do you think should be considered in this relationship?
11. How does [the company/project] take into account the concerns of local community in its decisions?

12. In your opinion, what is the general attitude of local people towards [the company/project]? If there is a lack of community trust in the [the company/project], what is the cause?
13. What do you think [the company/project] needs to do to gain the trust and support of the local community?

Questions for local administrations

1. Responsibilities and positions of the participants ……..
2. How many years have you been in charge of this work?
3. How many years have you lived in the soum?
4. What kind of assistance does [the company/project] provide to local people, businesses and administrations?
5. How much has soum tax revenue increased since [the company/project] began operations?
6. What progress has been made in your local economy since the start of the project?
7. What is [the company/project]'s relationship with the local community? What is the role of the local government in this relationship?
8. What are the positive and negative impacts of [the company/project]'s operation on the soum's social infrastructure? How much is [the company/project] spending on local infrastructure, education, health, and social issues?
9. What do you think [the company/project] needs to do to gain the trust and support of the local community?
10. What do you think the government needs to do to increase public trust in the mining sector?

Questions for local businesses

1. Responsibilities and positions of the participants .....
2. How many years have you been in charge of this work? ....
3. How many years have you lived in the soum? ...
4. What direct and indirect changes have taken place in the market of the soum since the start of operations of [the company/project]?
5. Has there been any change in your business operations? Has your business's income, expenses, turnover, labor, and availability of raw materials changed as a result of [the company/project]'s operations? If so, what has changed?
6. What goods and services are supplied to [the company/project] by businesses and individuals in your soum and neighboring soums? If you supply goods and services, how much?
7. Has there been a problem with local business environment since [the company/project] began operations? If so, how should the issue be addressed?
8. In your opinion, what are the positive and negative changes in the social infrastructure due to the activities of [the company/project]? How has this impact affected other businesses and yours?
9. How possible is it for local businesses to work with [the company/project]? From what sources do your get information about [the company/project]?
10. How often does [the company/project] interact with local businesses and reflect their concerns in its operations?
11. What problems arise in communicating and cooperating with [the company/project]? How can these problems be solved?
12. Do you believe that the company will have a long-term positive impact on the local economy, business environment and your business?
13. Do you support and accept [the company/project]'s operations? Why?

Appendix 5. Other survey statistics

Table 5.1. *General information by bagh*

	Average age	Average household size	Participants	Male	Female
Elgen	47.6	3.7	38	26	12
Dersene us	48.9	3.2	57	26	31
Chuluut	47.8	3.7	43	26	14
Gurvansaikhan	43.6	3.6	39	23	16
Suugaant	48.0	3.6	34	14	20
Total	47.3	3.5	211	115	93

Table 5.2. *Employment status by age group*

	Employment	Unemployment
18-24	5	3
35-34	27	3
35-44	54	2
44-54	54	1
55-64	30	8
65+	14	10

Table 5.3*. Reason for not doing job*

	Frequency	Percent
Student	2	7%
Too old	17	63%
Homework, caring for baby	4	15%
Cannot find suitable job	3	11%
Sick/Cares of sick person	0	0%
Disabled	0	0%
Other	1	4%

Figure 5.1. *Household size by income*

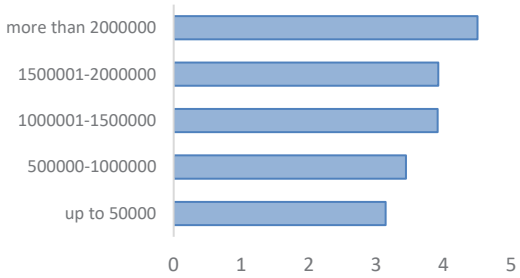


Figure 5.2. *Household income*

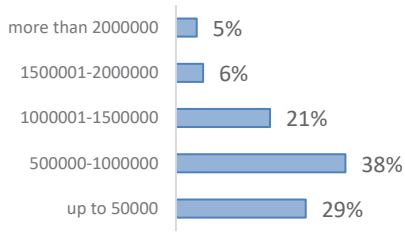


Table 5.4*. Impacts on social infrastructure by bagh*

	Elgen	Dersene us	Chuluut	Gurvansaikhan	Suugaand
Access to medical	2.97	3.12	3.09	3.00	2.91
Access to school	2.89	3.02	3.12	3.05	2.94
Local roads	2.71	2.86	2.84	2.89	2.79
Energy supply	2.94	3.09	3.12	2.97	2.85
Water resource	2.78	2.91	2.91	2.76	2.73
Total impact	2.84	3.07	3.00	2.95	2.94

Table 5.5*. Contact quantity descriptive statistics*

	Mean	Median	Std.Dev	Skewness	Kurtosis
Contact quantity in informal situations	1.29	1.00	0.84	2.92	10.53
Contact quantity in formal situations	1.11	1.00	0.55	5.53	34.49
Contact quantity	1.20	1.00	0.61	3.84	19.71

Figure 5.3. *Contact quality and quantity by bagh*

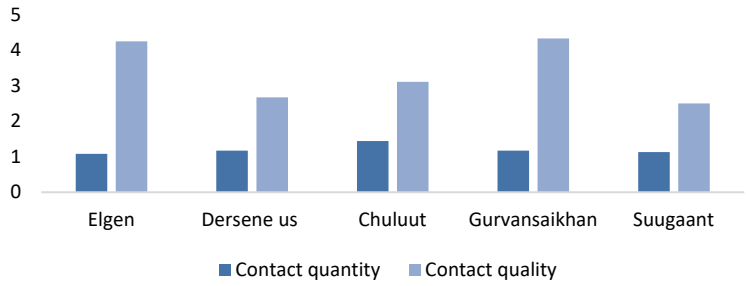


Table 5.6. *Procedural fairness descriptive statistics*

	Mean	Median	Std.Dev	Skewness	Kurtosis
The company includes us when making decisions	3.94	4	1.24	-1.21	3.44
The company listens to us	2.61	2	1.43	0.11	1.42
The company is concerned about our interest	2.51	2	1.34	0.22	1.63
Procedural fairness	3.23	3.3	1.29	-0.31	2.32

Figure 5.4. *Procedural fairness items correlations*

		1	2	3
1	The company includes us when making decisions	1.00		
2	The company listens to us	0.26	1.00	
3	The company is concerned about our interest	0.25	0.82	1.00

Figure 5.5. *Procedural fairness by bagh*

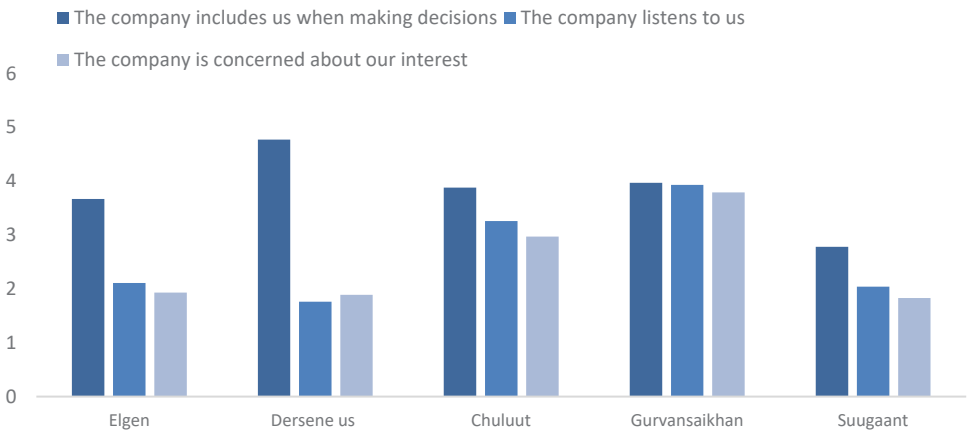


Figure 5.6*. Level of Trust by awareness*

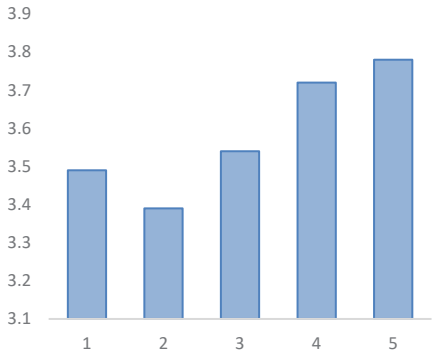


Figure 5.7. *Level of Trust by household income*

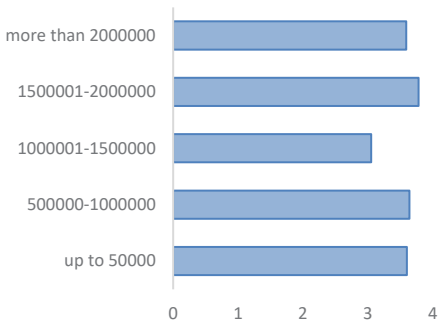


Table 5.5. *Trust items correlations*

		1	2	3	4
1	Trust the company to act responsibly	1.00			
2	Trust the company to do what is right	0.86	1.00		
3	Trust the company to act in the best of interest	0.79	0.81	1.00	
4	Trust the company generally	0.86	0.89	0.86	1.00

Figure 5.8. *Acceptance and approval by bagh*

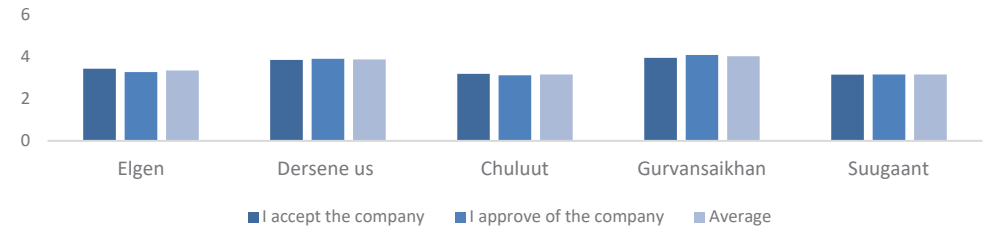


Table 5.6. *Acceptance and approval items correlations*

		1	2
1	I accept the company	1.00	
2	I approve of the company	0.92	1.00

Figure 5.9. *Acceptance and approval by age group*

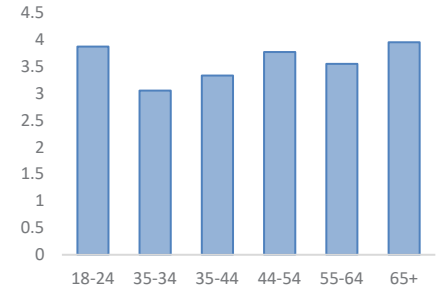


Figure 5.10. *Acceptance and approval by income*