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Hokkaido University
Graduate School of Environmental Science
Division of Environmental Science Development
Course in Global Environmental Science

The role of community trust in mining companies with focus on environmental perception: two case studies in Mongolia

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A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy
in Environmental Science

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The role of community trust in mining companies
with focus on environmental perception:
two case studies in Mongolia

(地域コミュニティの環境認知が鉱山会社への信頼に及ぼす役割：
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*Dedicated to my country with love inherited from my parents:
Wish to reserve wild nature and long live herders in grasslands*

Declaration

This dissertation is the result of my own work and includes nothing other than the outcomes of the work done during the course, except where specifically cited in the text. It has not been previously submitted, in part or whole, to any university or institution.

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Abstract

Many countries face the challenge of preserving the natural environment while extracting mineral resources for economic development. Mining industry in the world has crucial role for supplying minerals and metals for production of energy and goods. Mines are however, operated in the areas where communities are already engaged in agriculture which is crucial for food supplies in the country. Agriculture and mining industries should however co-exist in a sustainable way. People in the local communities are in close connections to the environment for generations from ancient times. Due to the perceptions of negative environmental impacts there have been numerous cases of local communities resisting mining operations. Various studies have been conducted on diverse aspects of mining resistances to prevent confrontations. Consequently, the studies agreed on a generic content that distrust of local community is one of the factors that influence mining resistances.

This research investigated the local communities' trust in two mining companies in Mongolia using a questionnaire survey. It should be noted that the mining sector is the primary industry in Mongolian economy. The mining companies operate in the grasslands where nomadic herders graze their livestock for their livelihood and produce food for the country. However, some mining companies have caused environmental problems e.g. water pollution and land degradation. These environmental problems might have caused some negative impacts on residents' lives. For example: if water sources decreased due to mining, nomadic herders would face difficulties of water shortage for drinking themselves and for livestock. However, those negative impacts on residents' lives have not been studied in Mongolia. Furthermore, if local residents perceive negative environmental impacts, trust in the company will decrease and they might resist the mining operation. Therefore, it is crucial to study the local community's environmental perceptions in order to maintain trust in mining companies.

In addition, previous literatures have indicated that residents who live in close connections to their natural environment value their ecosystem more than others who do not. Considering this statement, the respondents in the survey had different residential types like nomadic herders and town citizens.

Two mining companies, abbreviated as G and U, are described as following. G was a privately owned, foreign, gold mining company located in Selenge Province. The main facilities consisted of an open pit mine, a process plant and other facilities. The company highly

prioritized establishing positive relations with the local communities by contributing to a financial fund and providing information to the residents through two representative offices. U company on the other hand, was a fluorite and iron mining, state owned company located in Khentii Province. The company extracted ore at several mines in the nearest provinces and processed in a plant. The survey was conducted in a town which U company constructed for their workers.

We assessed the determinants of trust including motivation and ability. In addition, a new determinant “Environmental protection” was tested through evaluating the company’s effort to maintain environment. The trust level differences within the local communities were tested in relation of these determinants. The roles of other influential factors such as information communicability, and salient value were considered in this study. Furthermore, the relation of trust and risk perception was tested.

Firstly, the results about G mining company showed that the trust levels varied within the local communities and the determinants of trust differently explained the state of trust. The nomadic herders residing close to the mine site observed the mining operation in their daily lives and had low trust, being sensitive to the environmental changes caused by the mining operation. Other herders, who lived far from the mine site, had neutral opinions. Town citizens, who lived tens of kilometers away from the mine site, however, had high trust which was closely related to positive perceptions of the financial contributions of the company for the local area development. Information provided by the company were distributed unevenly, thus the nomadic herders had less information than the town citizens. In addition, it was observed that the trust of the members of the local communities affected their risk perception on human health. Previous studies defined that this kind of result might lead to opposition of an institution. In order to mitigate risk perceptions, mining companies need to inform local community about their activities aimed at risk management, mitigation and safe condition. In this study, the respondents did not have much knowledge about the risk management of the company.

Secondly, in case of U mining company, the respondents were grouped into those who have worked and have not worked at the company. However, the opinions did not differ much between these two groups. Few responses were collected from the herders in the area and these have included in the open-ended answers. In terms of the trust of all the respondents, the determinants related with trust differently. Motivation and the new determinant “Environmental

protection” had positive correlation with trust. However, the respondents expressed various negative environmental impacts in the open-ended questions. In addition, the respondents were concerned about the working condition which has caused health problems for some of the workers as a result of the old equipment and machineries employed in the mines and the process plant. Surprisingly, the trust did not affect the risk perceptions of human health. It could be explained that the salient value was a stronger factor than the risk perceptions. The salient value represented in this site as a stable mining operation of the company, which the workers and the town citizens can benefit through salaries and taxes.

Overall, the trust in the mining companies showed different characteristics for the two mine sites. Nomadic herders who lived close to the mine site had low trust due to the perceptions of environmental impacts such as landscape alteration and the risks of a toxic chemical. Environmental perceptions can play an important role as a power balance between local community and a mining company. When local residents perceive negative impacts on environment, the mining operation might be interrupted. On the other hand, in the case of U mining company, where mining industry was dominant in the area, the trust level did not differ between the respondent groups due to the benefit derived from the mining companies. However, in open-ended questions the respondents in the U site expressed their concerns about various negative impacts on the natural environment from the mining operations. Due to these concerns, the trust level was lower in the U site than in the G site.

In addition, the impacts on natural environment might be a sign of negative impacts on nomadic herders’ lives. Further researches are required about those impacts. In terms of the low trust levels, local communities might resist the mining. Therefore, mining companies need to study the trust of local community and take appropriate measures to maintain trust.

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Chapter 1. Introduction

1.1 Mining industry and agriculture

From ancient times in the rural areas of many countries, people have lived in harmony with the lands, mountains and rivers for generations, engaging in crop cultivation and pastoralism. Suddenly, a mining company settles in the area, digging the land and using the river water to extract and supply natural resources for the global demands. What will be changed in the area? Will the mining operation bring positive changes and make lives better or will it cause difficulties in their lives? Facing these uncertain situations, the local people would trust in the mining company with expectation of development in the country and economic contributions.

If the mining company has good reputations with respect to the laws and the regulations in the country and remediates the mined land to their previous conditions, the local people would appreciate the economic contribution of the mining activity. On the other hand, if the mining company causes problems such as any kind of environmental pollution, the local people will face difficulties in their lives. Either of these cases, voices of local people needs to be studied to reveal their perceptions before any difficulties occurred and conflicts caused.

Many countries in the world face challenges in preserving natural environment while extracting mineral resources for economic development. Mineral extraction is crucial for human lives providing energy and metals for goods production; however, it also results in impacts on natural environments. On the other hand, local people are engaged in agricultural activities wishes to preserve the natural environment for future generations. Therefore, mining companies have to preserve these natural environments for the satisfaction of local people and in order to ensure the co-existence for both subjects.

The mineral extraction in the world has been increasing since 1950s and the major lift has taken place in the past decade to meet the growing global demand for natural resources (Conde and Le Billon, 2017). Mining activities took place widely in the United States, Canada and Australia until the mid-1990s and since then the mining investments has moved to the developing countries in Latin America, Sub Saharan Africa, Southeast Asia, in the Pacific Islands and in Central Asia (Dougherty and Olsen, 2014).

Due to these worldwide expansions of mineral extractions, the mining conflicts between mining companies and local communities have been increasing. While fewer than 50 conflicts were recorded annually up to year 2000, the numbers have steadily risen to 250 conflicts in

2016, which means annual case of the conflicts has increased 5 times in last 16 years (Conde and Le Billon, 2017; Temper, L, del Bene and Martinez-Alier, 2015). Various studies have been conducted on diverse aspects of mining conflicts to prevent confrontations and ensure sustainable mining development and satisfaction of local people. Previous studies suggested a generic content that distrust of local community is one of the factors that evokes mining resistances (Conde and Le Billon, 2017; Moffat and Zhang, 2014). After reviewing 224 literatures, Conde and Billion (2017) found that distrust towards the mining company and environmental impacts of a mining are some of the related factors which are the reasons for mining conflicts. In addition, they described various types of the factors that caused mining conflicts in the past such as: state related, mining companies related, local communities related and mining project related factors.

Literatures described that the perceptions of mining's adverse effects on natural environment lead to distrust and resistance. For example, mining effect on water quality and quantity caused a conflict in Peru (Bebbington and Williams, 2008). Local people resisted mining in Mongolia due to water contamination and land alteration (Beck et al., 2007; Dalaibuyan, 2012; Reeves, 2011). In Andean highlands of Peru, local residents competed for land and water (Conde and Le Billon, 2017).

Besides, in some cases in the past, the residents resisted the mining companies before the onset of the operation because they perceived that negative impacts on the environment might be caused in the future. Conflicts occurred in many cases when the proximate community was dependent on agriculture and the mining operation perceived to have impacts on water and land (Conde and Billion, 2017). One of the example cases as following. Taylor (2011) described that Vale company was preparing for a gold and copper mining operation in Condebamba Valley, Peru. The local villagers protested before the start of mining operation because negative impacts on water and land might be caused, like people had experienced in other areas in Peru. In addition, the protestors wanted to defend the agriculture in the village for their livelihood and for future generations.

1.2 Study area

1.2.1 Mining industry in the economy of Mongolia

We have investigated the local community's trust in two mining companies using a questionnaire survey for the residents who have lived in the area of the mine sites in Mongolia.

One company was G gold mining company (the company’s identity is withheld, and the name abbreviated), which was invested in by a foreign company. This company had a relationship without resistance by the local communities for more than a decade. The other was U mining company, which was owned by the Mongolian and Russian state.

The mining sector is the primary industry in Mongolia, which produced 78.8% of the export income in 2015 (Jigjid, 2016). About 8.1% of Mongolia’s total land is under mineral exploration and extracting licenses. The main types of metals and minerals production in Mongolia in 2017 are shown below in Table 1.1

Table 1.1 The main types of metals and minerals production in Mongolia, annually in 2017

No	Metals and minerals	Unit	Production	No	Metals and minerals	Unit	Production
1	Copper concentrate	thousand tons	1,317.1	4	Fluorspar concentrate	thousand tons	55.2
2	Molybdenum concentrate	tons	5,616.7	5	Iron concentrate	thousand tons	3,675.0
3	Gold	kilogram	19,846.8	6	Zinc concentrate	thousand tons	82.7

According to the Department of Mineral Resources and Oil of Mongolia, the role of mining industry indicated between 14.9% and 21.5% of Gross Domestic Production (GDP) and between 14% and 21% of Gross Industrial Production (GIP) from 2010 to 2017 (Figure 1.1) (Report of the Department of Mineral Resources and Oil of Mongolia, p11).

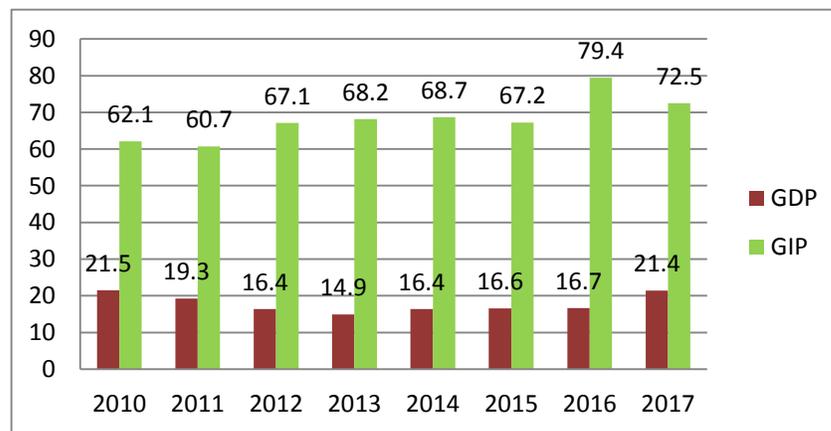


Figure 1.1 Mining industry in the economy of Mongolia (%)

1.2.2 Local communities

1.2.2.1 Pastoralism and nomadic herders

Agriculture in Mongolia consists of livestock husbandry (horse, cattle, sheep, goat and camel) which is a traditional way of pastoralism, household animals (poultry and pig) that originated from the foreign countries and cultivation of wheat and vegetable crops. The main types of agricultural products are shown in Table 1.2.

Table 1.2 The main types of agricultural products in Mongolia

Livestock	Number (thousand head)	Type of harvest	Crops (thousand tons)
Horse	3,939.8	Wheat	231.4
Cattle	4,388.5	Potatoes	121.8
Sheep	30,109.9	Other vegetables	82.1
Goat	27,346.7	Fodder crops	47.9
Camel	434.1	Industrial crops	13.9
Household animal		Oats	3.5
Poultry	705.1	Barley	1.7
Pig	31.9	Fruits	1.5

According to above table, the number of livestock is large, thus the livestock husbandry produce the most part of the agricultural productions. Pastoralists produce meat and dairy products by raising livestock, which is the main source of food in the country (Tumurtoogo, 2009). In addition, livestock herders produce raw materials of cashmere, wool and leather which are required for production of export commodities in the country. In this respect, livestock herding is the second most important economic unit, followed the mining sector. In comparison, crop cultivation takes place on relatively small land because warm and wet season is short in Mongolia. Therefore, we study here the opinions of nomadic herders.

Mine sites are mostly located on rural grassland areas which are primarily inhabited by pastoralist communities with nomadic herders. Pastoralism became an economic enterprise as well as strong cultural identity in Mongolia (Sharma et al., 2016). Mining industry and pastoralism need to ensure sustainable development and co-exist for economic growth.

Nomadic herders move freely (Purevsuren, 2001) tracking good quality grasses for their livestock. There are no fences on pasture land and huge area is allocated by the herders. Therefore, nomadic pastoralism is a traditional way of living that depends on the use of grassland pasture and natural drinking water (Cane et al., 2015; Sharma et al., 2016). It has deep-rooted connections to land and water through their livelihood and spiritual beliefs. On the other hand, nomadic herders mobilize within a limited area which has been used and handed down from their grand relatives for generations. Within this customary land area, seasonal camps and pastures are fixed. Moving outside of this limited area is rare, and it occurs in a situation when the quality of the grasses is poor. They have to ask permission from other herders in the new area and the local authority. If they cannot get the permission it is not allowed to come in the new area.

Nomadic herders have knowledge about natural environment, usually inherited from their ancestors, because they interact with nature every day. Also, knowledge of natural environment is very important for raising livestock. Change in environment is easily recognized by nomadic herders. Furthermore, according to Mongolian customs, human alteration to the environment (ground and rivers) is a failure to adhere and interact with nature in the proper way. Water and pasture quality are the pastoralist's main concerns (Sternberg, 2008).

1.2.2.2 Other communities

In the areas of mining, there are members of the local communities those benefits from mining activities through being employed in a mining company. People are willing to work in mining companies for income (Cane et al., 2015; p24). Also, some mining companies provide job opportunities for some herders who lost their livestock during extreme weather in winter (Sharma et al., 2016). In addition to direct employment, local business owners and private employees supply services, goods and food to mining companies (Cane et al, 2015, p25). The Law on Minerals (2006) outlined minimum employment quotas for Mongolians in a mining project.

1.2.3 Environmental problems and resistances of mining companies in Mongolia

The mining sector remains the country's main source of environmentally harmful economic activity (Reeves, 2011, p467) and it threatens to upset Mongolia's unique biodiversity, cultural heritage and traditional economic structure based on livestock herding (Sharma et al, 2015; Upton, 2012). In many areas rapid expansion of mining has occurred alongside dramatic changes in land use, water use and herder's livelihoods. Nomadic livestock herding is under serious threat by the drivers of socio-economic change brought by growing national and international interest in mining and resource development activities from bio-physical changes occurring as a result of increasing climatic variability and change. Water and land related environmental impacts of mining activities have been recorded in Mongolia.

McIntyre et al., (2016) reported serious water pollution in the Shariin Gol River, in Selenge Province, North Mongolia, due to a large-scale and small-scale mining companies and private miners (individual people mine at abandoned mine sites). In this area, a river stream was diverted to other course in order to reach a coal seam. Coal was washed and the water was treated in a sedimentation pond and discharged directly into the river. Also surface water of the mine pit was discharged into the river. Apparently, an examination on the river water quality showed that it had relatively low pH which was a sign of acidity. This was assumed as the impacts of small-scale mines located in the headwater area. The main issues the researchers noted was that the baseline data of the river water quality was limited and chemicals in the water were unknown and poorly regulated. Under the Law on Water (2012) the pollution of water should be penalized (Cane et al, 2015).



Figure 1.2 River water pollution caused by mining activities in the Shariin Gol River, North Mongolia

The authors expressed that a particular area of concern is the impact of mining on herder's lifestyle. For herders, pasture and water sources are critical natural resources. According to the

interview among the residents, some herders stopped the usage of river water and started using well water. Some of the herders were uncertain whether the river water was healthy for livestock. However, some herders still drank from the river water at the downstream.

Another case was described in the study by Evelien and Hendrik (2017). A large-scale mining company Oyu Tolgoi (OT), one of the largest copper-gold-silver mines in the world is located in Umno (south) Gobi Province where water is like a treasure because it is in the region of the Gobi desert. The mining company diverted a river to extract copper and gold at an open pit mine. After the diversion, the local residents experienced water decrease in the river and less water was available for the herders drinking and for their livestock. They complained to International Financial Corporation (IMF) about the situation. IMF conducted a survey that also reported about water decrease in the river. OT Company denied the water decrease and explained it was the impacts of global warming and overgrazing of the too many animals in the area. In the study Evelien and Hendrik (2017) mentioned that OT places itself outside the sphere of responsibility while causing the local herders to suffer and denied of a victim status”.

These kind of environmental problems from mining operations led local communities to cause number of resistances time to time in Mongolia. One of these was “Ongi River” movement which was initiated by the local herders and further involved some citizens from three provinces. They resisted the disappearance of the Ongi River and environmental degradation due to the mining activities. Earning a seven years` experience, the movement formed the Mongolian Nature Protection Coalition with a purpose to revolve around mining and related struggles over the land (Dalaibuyan, 2015).

1.2.4 Laws and regulations

The main concerns regarding mining impacts on natural environment are on water and land. A number of small scale local protests emerged across mine-affected regions in Mongolia in the mid-2000s where local communities experienced adverse environmental impacts and security of people’s livelihood. Mongolian Parliament and the Government aimed for strengthening the laws and regulations. The parliament approved the Law on Minerals in 2006 to improve the local level agreement of mining companies and social performances. However, series of water and other environmental problems were caused throughout the country. Thus, the Law on Prohibition of Mineral Exploration and Mining activities in the Headwaters of Rivers Areas, Protected Water zones and Forested Areas (known as the Law with long name) was approved in

2009 in order to prohibit pollution of water sources and alteration of water courses. After the enforcement of this law, over 200 existing exploration and mining licenses were revoked by the Government, mainly at small and medium-sized alluvial gold deposits. To calm down the growing public pressure, amendments were made to the Environmental Law in 2010. It provided for citizens and civic groups to hold the responsible parties accountable for environmental damages (Dalaibuyan, 2015).

Developing countries have little regulatory capacity to contain mining operations (Dougherty and Olsen, 2014). Mongolia is one of these countries that still need improvements in regulatory systems. Absence of regulations for land use causes herders uncertain situations. Although, herders use pasture lands from generation to generation for hundreds of years, pasture land is not owned by herders by the Law on Land (2004). Formally they have lease (right to use the land) from the local government (Cane et al, 2014). Thus, in some cases the herders' right for land use and for compensation was neglected when mining companies operate on the former pasture land after obtaining mining licenses. For example, customary winter pasture land for a herder family was damaged by mining activities but no compensation was paid by the mining company. The company informed that they had a mining license (Upton, 2012, p14). In order to balance this situation, laws and regulations ought to be considered and revised.

There are plenty of laws and regulations, however, environmental problems and illegal activities of mining companies still occur. It is because the role of the government and local government are not adequate to control the illegal actions.

1.2.5 Purpose of the study and the role of trust for co-existence of mining and local communities

In order to provide sustainable co-existence of local communities and mining companies, the trust needs to be studied. In this study we propose local community's trust has an important role as described below in Figure 1.3. A mining company can earn support or be resisted due to the trust level in the local area. Before a mining operation initialize, local people live normal lives cultivating crop or pasturing livestock but as a mining operation starts extracting minerals in the area, local people perceive differently about the mining company. Usually people have positive perceptions about the mining with expectation of economic benefit and development for the country or the area. This expression of high trust will cause the local people to support the mining operation. As it was mentioned above, if a mining company cause problems e.g.

environmental pollution, it further have negative impacts on local people`s lives who are dependent on natural environment. For example, if river water was polluted, local people would search for other drinking water sources and hence experience hard times. Therefore, negative impacts on environment of mining operations such as water and land pollution would threaten the livelihood of nearby communities. In this situation, local people would have negative perceptions about the mining company. This leads to decrease of trust which might lead to resistance of the mining company.

Therefore, local communities` perceptions must be studied during the mining operation in order to reveal concerns of local communities and to clarify the trust levels. It can prevent resistances by local communities.

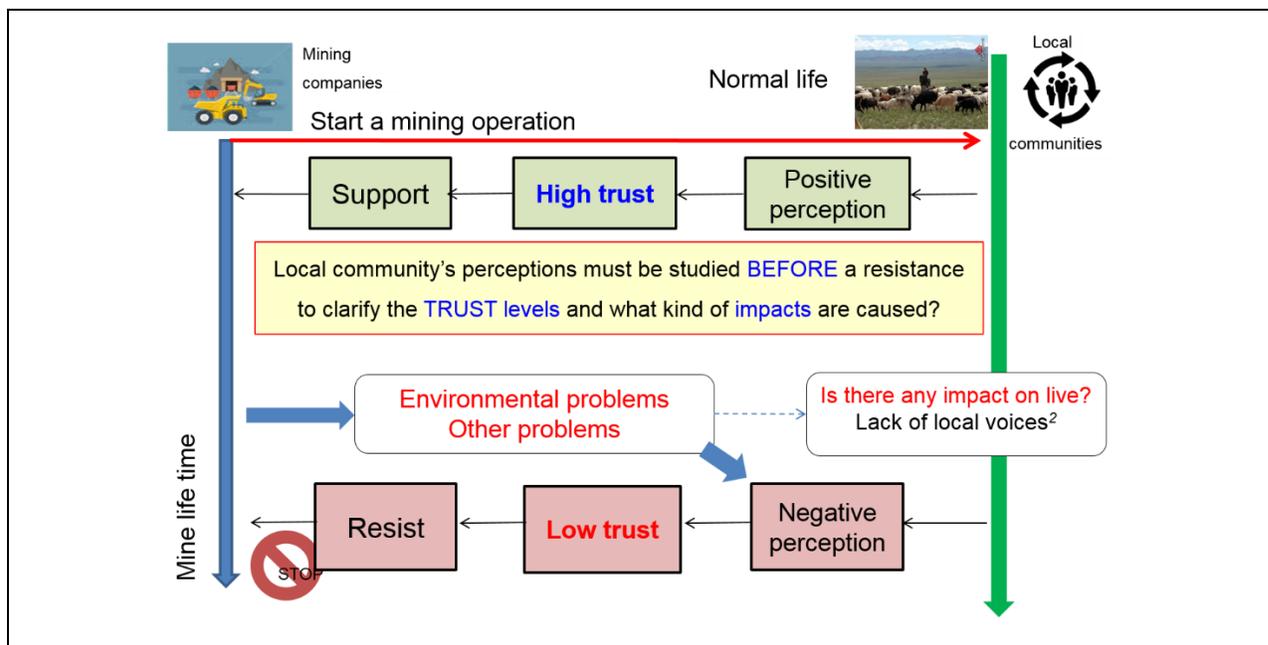


Figure 1.3 The role of trust for co-existence of mining companies and local communities

The purposes of this study are the following: How trust is formulated among local communities? What the reasons are of high and low trusts? We examined here three determinants: motivation, ability and environmental protection whether these can define trust of local community, as shown in the model in Figure 1.4. Further, the relation between trust and the three determinants was examined considering the diverse structure of the community.

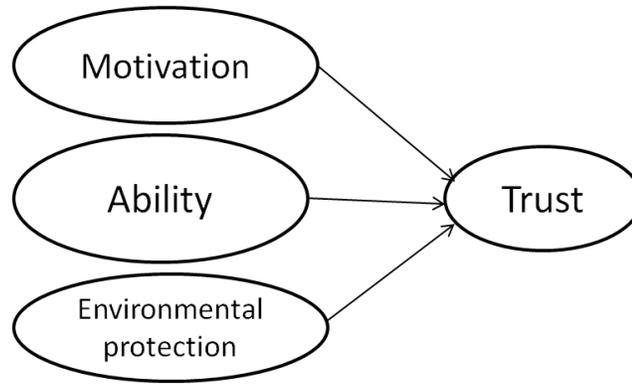


Figure 1.4 Model tested in the study

The purpose will be completed by finding answers for the following questions.

1. Define the determinants of trust and the trust level differences
 - 1.1 What determinants define the trust of local community in the mining company?
 - 1.2 How did the trust level differ among the local communities?
 - 1.3 Which of the determinants are important for each local community?
2. Define the other influences on TRUST
 - 2.1 How did the company's information provision effect on trust levels?
 - 2.2 How did the salient value effect on trust levels?
 - 2.3 Why the trust levels differed among the local communities?
 - 2.4 How the trust was different in the two mining sites?

Chapter 2. Theoretical framework

2.1 Theories of trust

Mining companies need to gain trust of local community to avoid resistances. Studying the state of trust prior to a problem would help us maintain trust in the future (Möllering et al., 2004) considering how trust is formulated within local communities. According to previous studies, trust is formulated based on perceptions of various determinants e.g. ability, motivation or salient value. In addition to those determinants, we emphasize in this study “Local communities’ environmental perception” plays important role for formulation of trust which refers observation how a mining company makes effort to reserve natural environment. These environmental perceptions influence on their trust levels that might lead to opposition of a mining operation in some cases.

What is trust? Why mining companies have to gain trust of local community? Previous studies described that social trust is important when people do not have knowledge about technologies, activities or institutions. For ordinary individuals, it is difficult to judge about negative impacts and risks of an operation (Nakayachi, 2012, p241). Therefore, local community trust for the decisions of the mining company makes and believes that there will not be negative impacts (Kasperson et al., 1988). In addition, local community trust scientists, authority or institution that claims about safe mining operation. In this meaning, trust has a role to minimize the complexity in the situation (Earle and Cvetkovich, 1995). For instance, when a mining operation initiated in a rural area, there might be negative impacts on environment. However, local people put aside the probability of negative impacts and support the mining. This is consistent with the description of Luhmann (1979) which stated that “Trust bears upon a critical alternative, in which the harm resulting from a breach of trust may be greater than the benefit to be gained from the trust proving warranted”.

Other researchers provided wider definitions about trust. Barber (1983, pp.9-15) described trust as an “expectation” that “partners in interaction will carry out their fiduciary obligations and responsibilities, which are their duties in certain situations to place others’ interests before their own.”

Möllering (2006, pp.110-111) described that trust is the hub of a wheel surrounded by reason, routine, and reflexivity in the rim and explained as following. The reason for trust is the interests or tasks of the subjects in the particular situation. The subjects follow routines that

consist of written and unwritten rules. Working together for a while, people build trust, which increases reflexivity and allows the uninterrupted completion of tasks. There are risks, vulnerabilities, and uncertainties during completion of the task; however, these are suspended through the action. This means, the suspension connects the hub and rim to ensure that the task will be completed without any cease like the wheel turns successfully.

From these wide applying theory, in narrow field of local community's trust in a mining company was studied as follows. Horowitz (2010) studied a case about why some workers of a mining company trusted in the company and the scientists. While some of the workers did not trust that the mining operation would cause negative impacts on environment, specifically on the fishing ground. They united to an anti-mining protest group. The study concluded that trust depends on an individual's "affiliation", which was described as "a sense of solidarity with the protest group or the mining company". Dougherty and Olsen (2014) defined an individual's self-efficacy as an individual's "belief in his/her capability to control...events." Self-efficacy influences institutional trust and interpersonal trust, which are related to a support or an opposition of a mining activity, respectively.

Above mentioned studies defined low and high trust levels within local communities. When trust is low it leads to resistance or conflicts. However, the state of trust including trust levels need to be studied and revealed before a resistance occurred. When a resistance movement has launched against a mining operation, everybody knows "the trust has declined". Mollering (2004) noted that "Agents only become aware of trust when it is problematic. In this light the recent interest in trust is by no means surprising, hypocritical." Therefore, we conducted this study when it was peaceful between the mining company and the local communities without any resistance.

The study includes both quantitative and qualitative methods of survey. The results of quantitative analysis give message at macro level. However, Dougherty and Olsen (2014) remarked that looking only at macro-structural level lack the reasons at micro level. It is efficient to look at macro level determining trust by the factors then look at detail at micro level using the qualitative data referring to residents' voices by open-ended questions.

2.2 Determinants of trust: motivation, ability, environmental protection

Public trusts in organizations or companies were measured in various previous studies. Trust is evaluated in relation of different determinants using public surveys.

The determinants are different depending on the study. Peters et al., (1997) evaluated public trust and credibility in the Government and the industry for environmental decision making. They found that trust increases if public perceptions about the knowledge and expertise, openness and honesty, and concern and care are high. Moffat and Zhang (2014) described trust as an indication of acceptance and approval in the local area within the context of evaluation of social license for mining companies to operate. They indicated that a mining company's effort to improve social infrastructure, contact quality, and procedural fairness is significantly related to trust. In the study of Nakayachi "Safe, but cannot be relieved: Psychology over trust" (2008, p175) it was described that trust is built upon the evaluation about ability which is professional knowledge and motivation which illustrated meaning of take seriously toward the problem faced. Nakayachi et al., (2014), used the determinants motivation, ability, and salient value similarity (SVS) to define public trust in eight organizations concerned with risks of the Great East Japan Earthquakes.

In reflection of above mentioned studies, we regard the determinants of trust in this study as motivation and ability. In addition we test here a new determinant of trust "The company's effort to maintain environmental protection (abbreviated as "environmental protection"). These determinants are described below. In some studies, SVS was analyzed in the quantitative analysis to test the relation with trust, but here we defined SVS by qualitative data using answers of an open-ended question as it will be explained in Section 2.4.

2.2.1 The first determinant: motivation

Trust is formulated based on the perception of fairness (Renn and Levine, 1991) and care (Peters et al., 1997). For example, in a case of mining, members of a local community observe whether the mining company takes care of the issues that residents face due to the mining operation and solves them fairly.

2.2.2 The second determinant: ability

This is related to the knowledge and intelligence (Hovland et al., 1953) and expectations of technically competent performance (Barber, 1983). In the study of Dougherty and Olsen (2014), the residents trusted the mining company, saying, "The company has good and reliable equipment.". People develop trust when they believe in their ability and reliability of a subject (Möllering, 2005). We define the ability based on the above mentioned characteristics of knowledge, expertise, intelligence, and competitive performance. For example, in case of

mining, the members of local community consider whether a mining operation utilizes reliable technologies and equipment and whether the professionals and workers at the mine site have knowledge and skills to mitigate the negative effects on the natural environment and social life.

2.2.3 The third determinant: “The company’s effort to maintain environmental protection”

As the third determinant of trust, we propose that residents’ perception of the company’s effort to maintain environmental protection affects trust. It is based on residents’ evaluation of how a company is monitoring and mitigating negative environmental impacts during extended period of the mining operation. Mining companies originally dig ground or use excess amount of water during a mining operation which might have various negative impacts on natural environment. Particularly, an open pit mine leads to complete landscape change and mineral processing has increasing risks associated with handling and accommodating toxic chemicals. Mining companies take environmental protection measures to minimize these impacts and risks. Specifically, mining companies rehabilitate dug ground in mining pits and re-vegetate to recover the land. Also, they purify used water for mineral production and re-use water or discharge into natural environment if the water meets the clean water standards.

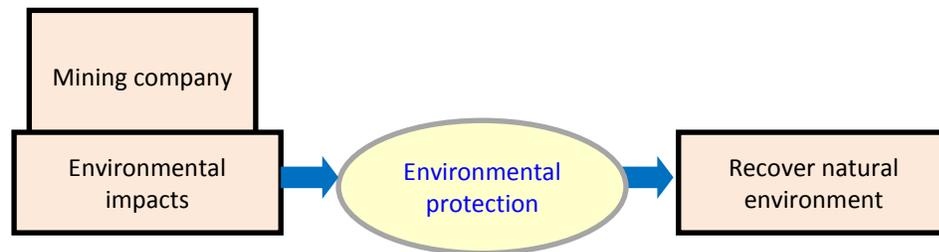


Figure 2.1 Description of the new determinant “Environmental Protection” in this study

Local communities are concerned about environmental impacts and risks of the mining operation from the initial step. Their environmental perception is formulated upon observing how the mining company makes effort to protect natural environment. Trust is built based on the local community’s expectations that the mining company will make proper environmental decisions (Moffat and Zhang, 2014). Residents expect the natural environment to be same as before the mining started so they can use the land again.

If local communities perceive negative impacts on environment, trust will be low. Further, local people perceive risks on their health and lives. In this situation, local community might resist the mining operation. On the other hand, if local communities feel no impact on

environment, they trust in the mining company with low risk perceptions. In this case they support the mining operation. Therefore, we test in this study “Local community’s environmental perception affect trust in the mining company” same as other determinants.

2.3 Proximity factor and environmental perception

Studies based on community surveys illustrated that “Residents who live close to a nature are possibly more concerned with its environmental quality” (Brody et al., 2004). This means residents’ environmental perceptions depend on the spatial distribution of residency (Brody et al., 2005). Folks, living in close connections with natural environment have special salient values. Norton and Steinemann (2001) expressed these values as the feeling of honor to nature more than other people, which connects them to their ancestors and future generation. They described an example as following: “A hunter told a story about deer hunting in a river valley that connects him with past two generations and hope for future in his son’s life. His feeling about the river and forest plays important role for evaluation of the natural environment. If these values were diminished, the people would lose the self-sense and sense of community members. This sense of place is impossible to capture scientifically in basic measures such as economic measures and the loss cannot be expressed in monetary currency”. Ariansen (1997) described this as the ‘constitutive values’ equal to the identity and integrity (honor) of the place. This is an individual’s as well as a particular community’s salient value which policy makers or project implementing institutions such as a mining company should consider in participatory process.

The surveys in this study were conducted in two sites in Mongolia. In one site, we compared the responses of the nomadic herders who lived in proximity to the mine site with other nomadic herders lived in far distances to the mine. A local community of nomadic herders who live in proximity to the mine site might have different trust level.

2.4 Salient Value Similarity (SVS) in this study

SVS is one of the strong factors that influence trust. It is defined as an evaluation of values shared by the subjects. Individuals who judge an organization’s values to be similar to their own values have more trust in the organization (Earle and Cvetkovich, 1995). Salient value differs across situations and individuals depending on the problem and available solutions (Siegrist et al., 2001). For example, in an area if the rate of cancer was higher compared to other areas, the residents of that area would expect the authority to pay particular attention to the public health

and information policy. If the authority prioritized these values, the residents would trust them (Siegrist et al., 2001).

Considering this case study, what could be the salient value for the residents living in an area where a mining company was operating? For nomadic herders, the salient value might be the use of pastureland and water for livestock, since the mining operation might alter the natural landscape or have negative effects due to the use of toxic chemicals. Meanwhile, other residents might expect the mining operation to benefit the area or the country economically. If the mining company shares these important values and does not pollute the pastureland and water while contributing financially, then the herders and other residents would develop trust in the company. In this respect, we aimed to determine the salient value for the residents in this case studies separately from the other determinants. We analyzed the answers of an open-ended question to determine SVS for each mine site.

2.5 Information communicability

The studies of Peters (1997), and Moffat and Zhang (2014) indicated that the amount of information received from the mining company and contact quality affect trust.

Lack of local voices might lead to hidden trust lose while trust can increase with effective communications. In order to ensure sustainable mining operation, Lawson and their team (Lawson, 2017; CSIRO website, accessed 3 Dec 2017) conducted community surveys in South Africa to identify the factors that build and reduce trust in a company. The researchers found that communities' trust in the mining company increased when the community members felt listened and responded by the company. Trial survey was built upon knowledge gained from Australian and global communities through listening to them. "Community members felt listened and responded to the mine which in turn increased their trust and acceptance," said Dr. Moffat. The survey results were aggregated and analyzed using sophisticated models by the research team.

2.6 Relation between trust and risk perception

2.6.1 Risks of a mining operation and risk communication

A mining operation possesses risks e.g. handle and accommodate toxic chemicals or dig deep ground that might fall human or animals and other risks. Therefore, a mining company have to assess potential risks of mining extraction and mineral processing and implement risk mitigation programs as required for risk managing institutions. On the other hand, residents trust

the mining company that the company can handle the risks and there would not be harm during the mining lifetime. This is residents' support for the company.

As mentioned above, people evaluate an institution through the determinants of trust. If people have negative perceptions, the trust level would decline. People's trust level affects further risk perception and determines whether gain support or opposition of people (Nakayachi, 2014; Siegrist and Cvetkovich, 2000). High trust tends to result in low perception of risks with high perception of benefit (Siegrist et al., 2000). Contrary, low trust leads to high perception of risks. When people's trust decrease they perceive more risks on their health and lives (Nakayachi, 2014). When they feel high risks, people oppose an organization or institution that might harm their health or lives.

In order to maintain trust of residents, a mining company should have risk communication while managing the risks effectively. However, risk mitigation process is usually demands high professional knowledge (Nakayachi, 2008, p192). For example, toxic chemicals such as cyanide are used for leaching ore to extract gold. These chemicals are handled through strict procedures that are not spilled in surrounding environment. Then detoxified and accommodated in a tailings facility.

Risk communication means the mining company should delivery information for local residents about how the real risks are mitigated e.g. the cyanide should be handled, detoxified and accommodated safely that would not cause harm for the surrounding environment. However, it is not easy to explain for ordinary residents this professional knowledge, rather might cause confusion or doubt about the risk managers. Therefore, method of the information delivery should be based on psychological interpretation that the recipients have accurate knowledge about the risk and understand "The company is assessing and minimizing risks, ensuring a safe mining operation without causing harm for natural environment and human health" (Fessenden-Raden et al., 1987). Respondent's level of concern with environmental health risks will be negatively related to trust and credibility of industry (Peters, 1997).

Chapter 3. Methodology

3.1. Questionnaire

The questions of the surveys and the analytical flow are described below.

3.1.1. Quantitative data

Quantitative group questions 1. The questions listed below assessed the trust level and determined the trust on five-point Likert scale (Likert, 1932) ranging as following.

The questions and the analyses were designed based on the literature review (Nakayachi, K., Kudo, D., Ozaki, 2014; Sato and Ohnuma, 2013) and a preliminary survey was conducted in the same region in August 2013.

Questions assessing the trust and its determinants asked “Do you agree with a statement?”:

✧ Trust

“Residents respect the company.”

“Residents rely on the company.”

✧ Motivation

“The company is very conscious about the issues related to residents.”

“The company treats all problems fairly.”

✧ Ability

“The mining operation and mineral processing follows the appropriate technological regimes using modern equipment and machinery.”

“Workers in the mining company are highly skilled.”

✧ The company’s effort to protect environment (Environmental protection)

“The company is serious about environmental problems.”

“The company conducts environmental monitoring and controls contamination.”

The five-point Likert scale questions ranged as shown below.

	Range		Range
Strongly disagreed	1	Agreed	4
Disagreed	2	Strongly agreed	5
Neutral	3	Do not know	0

Quantitative question 2: “How often the company provides information to the local residents?” This is a question about information communicability of the company to investigate

whether the company provides information to the local residents about the mining operation, the company's activities in the area, and monitoring of environmental contamination and rehabilitation. The response options included not at all, rarely, seldom, often, and quite often.

Quantitative question 3 and 4: Two questions were used to clarify whether the respondents get information about risks of the mining operation and opinions about risk management to reduce the risks of the mining operation.

1. "Where do you get information about risks of the mining operation?" The response options included not at all, rarely, seldom, often, and quite often.
2. "What do you think about the risk management of this mining company?"

Quantitative group questions 5: Questions about trust and risk on human health was used to determine whether trust affect on risk perception of the respondents. These were five-point Likert scale (Likert, 1932) questions.

Questions about trust (same as in the Quantitative group questions 1):

Q1: "Residents respect the company"; Q2: "Residents rely on the company."

A question about risks on human health:

"Do you agree with a statement that there is no negative impact on human health?"

Quantitative question 6: To compare the two mining companies "What is the likelihood that the mining operation has negative impact on natural environment?"

3.1.2. The open-ended questions for qualitative data

The answers to open-ended questions were coded using structural coding method (Saldana, 2009, pp.66-70) to find a core phrase with the highest frequencies. The following questions were evaluated.

Qualitative question 1: To reveal and discuss the respondents' opinions about the company, a question "What is your opinion about the mining company and its activities?" was used.

Qualitative question 2: To define SVS for this case study, a question "What does the mining company need to consider for carrying out a long-time mining operation?" was used. The respondents were instructed to list up to three answers in the order of importance. The first out of the three answers were selected and analysed.

Qualitative question 3: To clarify about risk perception about mining operations of the respondents, a question “What are the risks of a mining operation in general?” was used.

3.2 Analytical flow

Basing on the purpose of the study, each task was analyzed by the following scheme on Figure 3.1 and the list below the scheme. Statistical analyses were conducted using IBM SPSS 24.0 software.

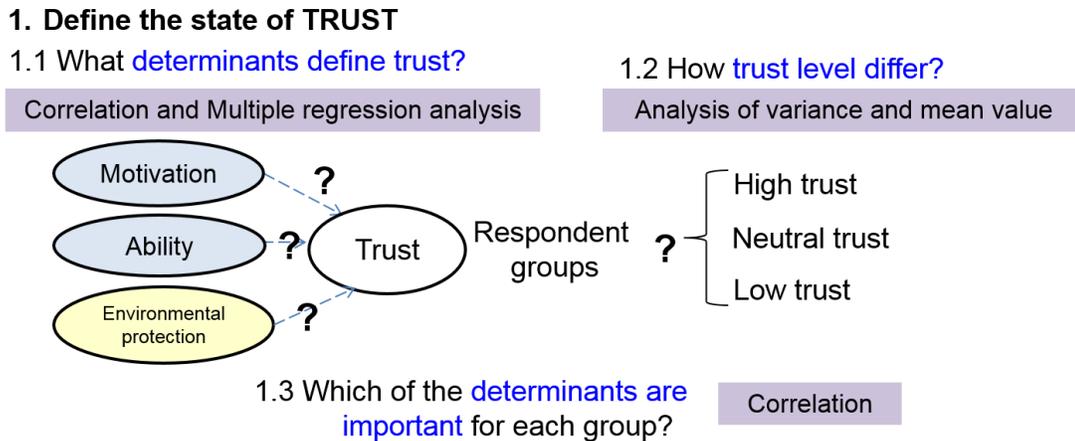


Figure 3.1 Analytical flow of the study, Part 1

Analytical flow of the study Part 2 and 3 (continued).

2. Define the other influences on TRUST:

2.1 How did the company’s information provision affect on trust levels?

The answers of the Quantitative question 2 were used.

2.2 How did the salient value affect on trust levels?

The answers of the Qualitative question 2 were used.

2.3 Why the trust levels differed among the local communities?

The answers of the Qualitative question 1 were used.

2.4 How the trust was different in the two mine sites?

The answers of the Qualitative question 6 were used.

3. Define the relation between Risk and Trust:

Using the answers of the Quantitative group questions 5 and Qualitative question 3.

Chapter 4. Trust of the nomadic herders and the town citizens in G mining company

4.1 Study site G

4.1.1 Study site: M and B soums¹, Selenge Province

G mining company is located in Selenge Province in north Mongolia. The company communicated with two soums: M soum and B soum. These soums are in the ecological zone of mountain forest and steppe. Annual average precipitation is high from 250 mm to 300 mm (National geographical atlas of Mongolia, 2009) compare to other areas. Therefore, the area is rich in pasture land with sources of water and grasses for livestock. Livestock husbandry is the most common industry in this province, thus the nomadic herders have high role in livelihood for local residents in the soums. These two soums occupy quite wide land of wheat crop and vegetable cultivation because Selenge province is the main region of crop cultivation in Mongolia. M soum is one of the biggest soums in the country. At the time of this survey, an alcohol beverage factory, wood and stone processing small plants were operating in the soum.

Table 4.1 Information of B and M soums, Selenge Province

	B	M
Land area (km ²)	197,628	484,373
Population	6,173	25,689
Male	2,564	12,678
Female	3,609	13,011
Children (under 16 years)	2,789	7,223
Adults	3,384	18,466
Labor age	3,951	16,407
Employed people	3,262	9,918
Number of families	1,267	5,530
Number of herder family	457	594

¹ A soum is a territorial administrative unit in Mongolia, similar to district.

4.1.2 G mining company

The mining company's identity is withheld because they refused to publish any information such as location, profiles of mining activities etc. The reason is that some residents and a NGO appealed to court against the mining company when the mining company was preparing to start another gold mine in same M soum. The argument was still due in the court at the time of the study.

G company in this case study appeared to be trusted. According to the news in the mass media, the mining company had a good reputation. It complied with the laws and regulations and international standards, used a modern technology, and took appropriate environmental protection measures.

The company highly prioritized the establishment of a positive relationship with the local communities. Two representative offices actively communicated with local residents in the soums. During the field survey we had interview with of a representative official in M soum. The content of the interview related to this study is shared here. They distributed information on a regular base using newspapers, brochures, and leaflets (Figure 4.1) that contained information on the company's activities, such as financial contributions, and environmental contamination controls which they conducted through regular monitoring programs (Interview with the representative of the mining company in the town of M soum, Personal communication, 2013, Selenge, Mongolia).



Figure 4.1 Distributed newspapers, brochures, and leaflets about the mining company²

The mining company dedicated a fund for the local area development for remodeling of schools and hospitals in the towns and a road construction. G company provided financial

² Source: Representative of the mining company in the town of M soum

contributions for Selenge Province, M and B soums, totally 7.3 billion tugrug (about 6 million US\$) between 2003 and 2014. Also, a fund of micro loan was dedicated to reduce unemployment since 2005 which local small business owners lent money from this fund.

The information about the company's commitment for environmental protection was distributed by a brochure of "Environmental Monitoring and Pollution Control Program". A brief content of the brochure is as following.

Environmental Monitoring and Pollution Control Program of G company included:

Water quality controls: Water quality exam by sampling water at the 19 underground water boreholes and sampling of the river water. Ground water levels were measured at all boreholes. Drinking water was sampled and examined the quality. Effluent from the process plant detoxified and diverted to the tailings facility. The tailings facility was constructed according to the related international standards and any seepage through the dams are controlled at the boreholes at the body of the dams.

Soil quality controls: Soils are sampled at 10 points in the mine site and 10 points outside the mine sites and examined for contamination.

Air quality controls: Dust in the mine pit measured for 24 hours at 6 fixed points. Air quality around the mine site is measured at 13 points by mobile devices weekly.

Bio monitoring: Vegetable and animals are monitored at the rehabilitated area.

Rehabilitation program: The company rehabilitated 359.7 ha mined area from 2003 to 2012 and planned to rehabilitate all the mined area up to year of 2020.

Environmental policy:

- Comply with related Environmental and other laws and regulations,
- Take measures to prevent from environmental pollution,
- Develop environmental management system,
- Control environmental pollution regularly in the mine site.

The company rehabilitated the mined area with responsibility conducting technical and biological rehabilitation, tree plantation, monitoring of animal migration. During the mining operation the company rehabilitated around half of the mined areas. After the mining closure they planned to rehabilitate all the mined area and conduct environmental recovery monitoring for five years. However, there was limitation in the rehabilitation; not possible to rehabilitate the mountain and the lakes.

G company hired about 200 local residents at the mine site for temporary and permanent positions during 10 years operational period (Personal communication, interview with a manager of the mining company, 2013 (Ulaanbaatar, Mongolia)).

4.1.3 Respondents of the questionnaire survey in the G site

G Mine and the residents of two adjacent soums in Selenge Province, Mongolia, were selected for the survey. The distances between the mine site and the two central towns of the soums were 19 and 25 kilometers, respectively. The questionnaire was administered to the local community members in the two soums in August 2014.

Demography of the survey participants are shown in Table 4.2. We obtained responses from 91 respondents between the ages from 18 to 71, with a mean age of 41 (SD=14). In the quantitative analyses, we included all responses. In the qualitative analyses, we excluded the data from the respondents with missing answers, using 71 responses.

Table 4.2 Demography of the survey participants

Occupation	%	Gender	%
Herder	50.7	Male	46.3
Government organization	4.2	Female	53.7
Works in a company	18.3	Total	100.0
Self employed	11.3		
Student	4.2	Years living in the <i>soums</i> , %	
Pensioner	5.6	Up to 5 years	8.5
Unemployed	2.9	6-10 years	21.1
Not replied	2.8	11-30 years	39.4
Total	100.0	More than 30 years	31.0
		Total	100.0
Education	%	Age	%
High school	73.2	18-29	23.6
College	8.5	30-49	38.9
University	18.3	50-69	34.7
Total	100.0	70 years above	2.8
		Total	100.0

The respondents were grouped into three groups: the town citizens, herders close, and other herders as shown in Table 4.3. It was based on the answers to a question about the distance between living location and the mine site.

Table 4.3. The respondent groups by the locations of residence

Respondent groups	Number of responses	Locations of residence
Town citizens	35	In the central towns of <i>soums</i> , far from the mine site
Herders, close to the mine site (abbreviated as “herders close”)	17	In the proximity to the mine site
Other herders	19	Within the territories of the <i>soums</i> , far from the mine site

We visited *ger*³ houses of the herders and collected answers from an adult in the family. Five respondents were crop farmers who cultivated wheat and vegetables seasonally near the mine site and had livestock as well; hence, we categorized them as herders. Regarding the total years of living in this *soum*, the respondents residing for more than 30 years, 11-30 years, 6-10 years, and up to 5 years comprised 31%, 39%, 21%, and 8% of the samples, respectively. The answer sheets were attached to a letter stating the purpose of the study and a statement ensuring that the identity of the respondents will not be revealed.

4.1.4 Excluded the missing answers and the reliability coefficients

The mean value was calculated for the answers of two questions in each item. It did not have evaluating score when there was a “Do not know” answer, for example if two answers had 4 and 5 scores it have the mean of 4.5 score. However, if two answers had 4 and 0 scores it have the mean of 2 score and the answers “Do not know” does not have an evaluating capability. Thus, we excluded the respondents with missing answers “Do not know”. Finally, 71 respondents were selected for the qualitative analyses from the original 91 respondents. Statistical analyses were conducted using IBM SPSS 24.0 software.

For each determinant, the Cronbach’s alpha (Cronbach, 1951) coefficient were calculated between the two items to determine the reliability. The values were as follows: ability ($\alpha=0.61$),

³ A *ger* is a dwelling of nomadic herders.

motivation ($\alpha=0.62$), environmental protection ($\alpha=0.64$), and trust ($\alpha=0.50$). The coefficients were moderate; thus, the mean value of the two items measuring each element was used for further analyses.

4.2 Results of the trust levels and the determinants of trust in the G site

4.2.1 The determinants of trust

To examine the determinants of trust, multiple regression analysis was conducted following the studies of Peters (1997) and Sato and Ohnuma (2013). The dependent variable was trust and independent variables were motivation, ability and environmental protection. The results of multi regression analysis in The G site showed that all three independent variables affected the dependent variable. This means the respondents' perception of motivation, ability and environmental protection affected trust in the mining company as shown in the path diagram in Figure 4.2 (multicollinearity coefficient $VIF < 1.41$; thus, the independent variables are not linearly related (Atsushi, 2004)).

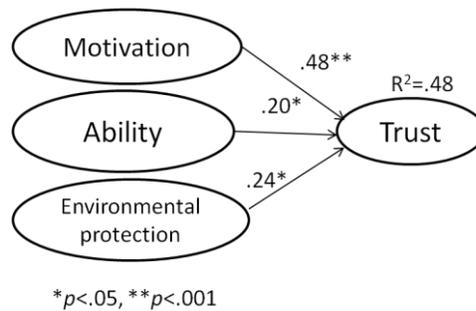


Figure 4.2 The determinants of trust by all respondents.

4.2.2 Trust level differences between the respondent groups

Trust was determined by the three elements, as indicated in Figure 4.2. Thus, we examined the trust level differences between the respondent groups. The mean values of the three determinants and trust are shown in Table 4.4.

Table 4.4 Mean values of each element and trust by the respondent groups.

Items	Ability	Motivation	Environmental protection	Trust
Respondent groups	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Herders close	3.97 (1.01)	2.82 (1.22)	3.15 (1.27)	3.15 (1.27)
Other herders	3.95 (0.72)	3.45 (1.05)	3.37 (1.04)	3.63 (1.12)
Town citizens	3.87 (0.98)	3.34 (1.20)	3.54 (1.26)	4.06 (0.94)

To measure the mean differences, we conducted the analysis of variance (ANOVA) with the three respondent groups as the predictor variables. Trust and the three determinants were the dependent variables and each dependent variable was tested separately. The results indicated that none of the following determinants were significant: ability $F(2,68)=0.08$, $p=.92$; motivation $F(2,68)=1.51$, $p=.23$; and environmental protection $F(2,68)=62$, $p=.54$. Only the interaction effects for the respondent groups in trust variable was significant, ($F(2,68)=3.90$, $p<.05$), which illustrates that the trust levels among the three respondent groups were statistically different. Further, a post-hoc test was used to compare the trust levels between the respondent groups (Tukey $p<.05$). The result showed that the trust levels were different for the town citizens and the herders close. This illustrates that the town citizens had high trust in the mining company, whereas the herders close had lower trust. The differences between the other herders and the other two respondent groups were non-significant, which means that the other herders had neutral opinion regarding trust.

4.2.3 Relation between trust and the determinants for each respondent group

The town citizens had high trust while the herders close had lower trust. Subsequently, we investigated the associations between the determinants and these trust levels. To achieve this, we computed Pearson's correlations between trust and the three determinants: ability, motivation, and environmental protection, for each respondent group, as shown in Table 4.5.

Table 4.5 Correlations between trust and the determinants by the respondent groups.

Respondent groups	Items	Ability	Motivation	Environmental protection
Herder close	Trust	.70**	.82**	.64**
Other herders	Trust	.33	.32	.43
Town citizens	Trust	.06	.62**	.50**

** $p < .01$

According to the table above, trust of the herders close in the mining company significantly correlated with ability, motivation, and environmental protection; and trust of the town citizens correlated with motivation and environmental protection. For the other herders, trust did not correlate with the three determinants.

4.2.4 The role of information communicability for trust level

The studies of Peters (1997) and Moffat and Zhang (2014) indicated that the amount of information received from the mining company and contact quality affect trust. In order to clarify whether residents got information from the mining company and its relation with trust level, a quantitative question was used. The results of the answers are shown in Figure 4.3.

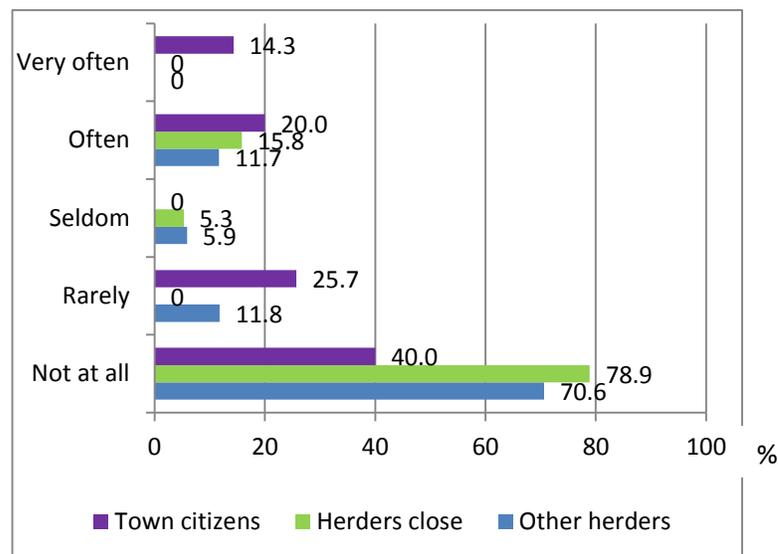


Figure 4.3 The respondent's answer about information communicability from G company

In this study, 43% of the town citizens, 71% of the herders close, and 79% of the other herders responded that they did not receive any information about the mining project. According to this result, most of the town citizen respondents received consistent information because they had easy access to the information sources, such as TV and the two representative offices of the mining company in both towns. On the contrary, most herders answered they did not get such information. It might be because the mining company disseminated information mainly in the towns. The herders close and other herders who lived tens of kilometers away from the towns and they did not have access to consistent information. The only way for them to obtain the information was to visit the towns.

On the open-ended question, some respondents mentioned that they received information from the company about the rehabilitation in the mined area and the financial contribution for the local area development. The company highly prioritized the establishment of a positive relationship with the local community. Two representative offices actively communicated with the residents and constantly distributed newspapers and brochures that contained information on the company's activities, such as public meetings, financial contributions, and environmental contamination control conducted through regular monitoring programs (Personal communication, Interview with a representative of G mining company in a town, Selenge Mongolia, 2013).

4.2.5 Defining SVS of the respondents

When trust level is low, SVS has been found to influence public trust in a risk managing organization (Nakayachi et al, 2014). In our study, SVS was not examined as a determinant of trust; however, we wanted to know whether there was a connection between trust levels and SVS. Salient value varies with the situation; hence, we defined it for this case study. The answers to the open-ended question were analyzed by coding. Two main themes emerged, as shown in Table 4.6: A. No environmental contamination and good rehabilitation; B. Contribution to the local area development. The remaining answers, which had different meanings than A or B, were placed in C category and excluded from the analysis. The number of A and B responses was analyzed using the chi-square test. The results showed that A occurred at a significantly higher rate ($\chi^2=5.49$, $p<.05$) compared to B, representing the salient value of the respondents.

Table 4.6 Defining the salient value: The coded answers.

Codes	Samples of answers	Number of responses
A. No environmental contamination and good quality rehabilitation	Do not cause contamination of the natural environment	n=28
	Good quality rehabilitation to be conducted in the mined land	
B. Contribution to the local area development	The mining company has to support the local area financially	n=13

4.3 Results of risk perceptions and relation with trust in the G site

4.3.1 The respondents' risk perception about a mining operation

The respondents' perception of mining risks was asked by the qualitative question 3 as it was mentioned in Section 3.1.1. The open-ended answers were classified and the three main categories were found as listed below.

✧ Negative impacts on environment

- Leave the mined land without rehabilitation,
- Cause environmental pollution such as cyanide pollution, water contamination, land distraction

✧ Accident

- Loss of human life
- Loss of livestock
- Accident of a vehicle
- Accident in an underground mine

✧ Financial problem for the mining company

A company invest for a mine and could not have profit

4.3.2 Knowledge about risk management of G mining company

Results of quantitative question 3 and 4 as mentioned in Section 3.1.2 are shown below.

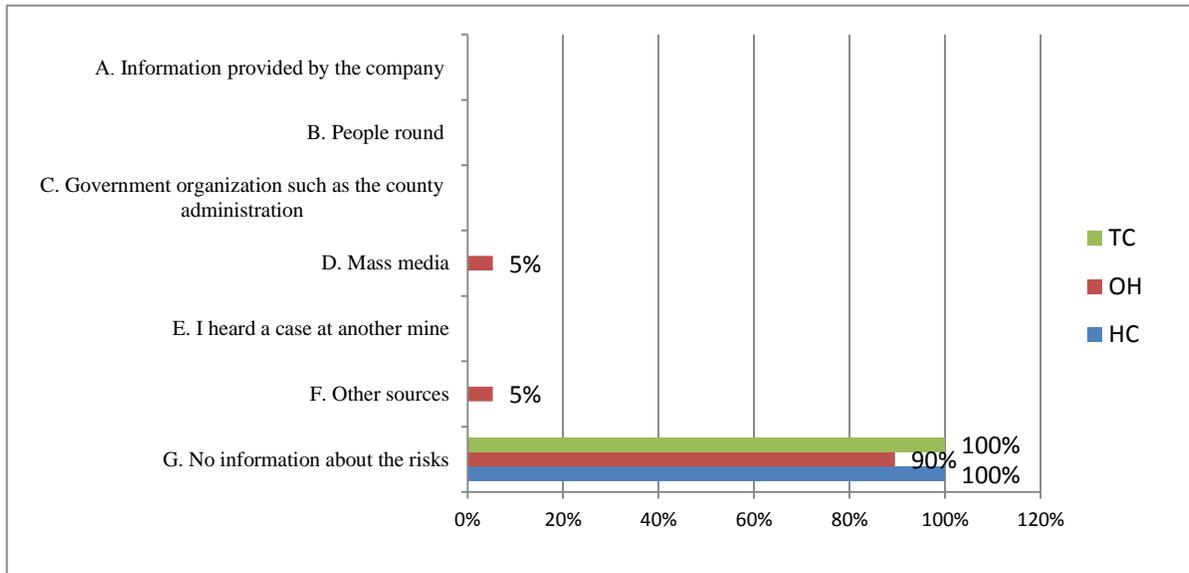


Figure 4.4 Answers about risk information from G company

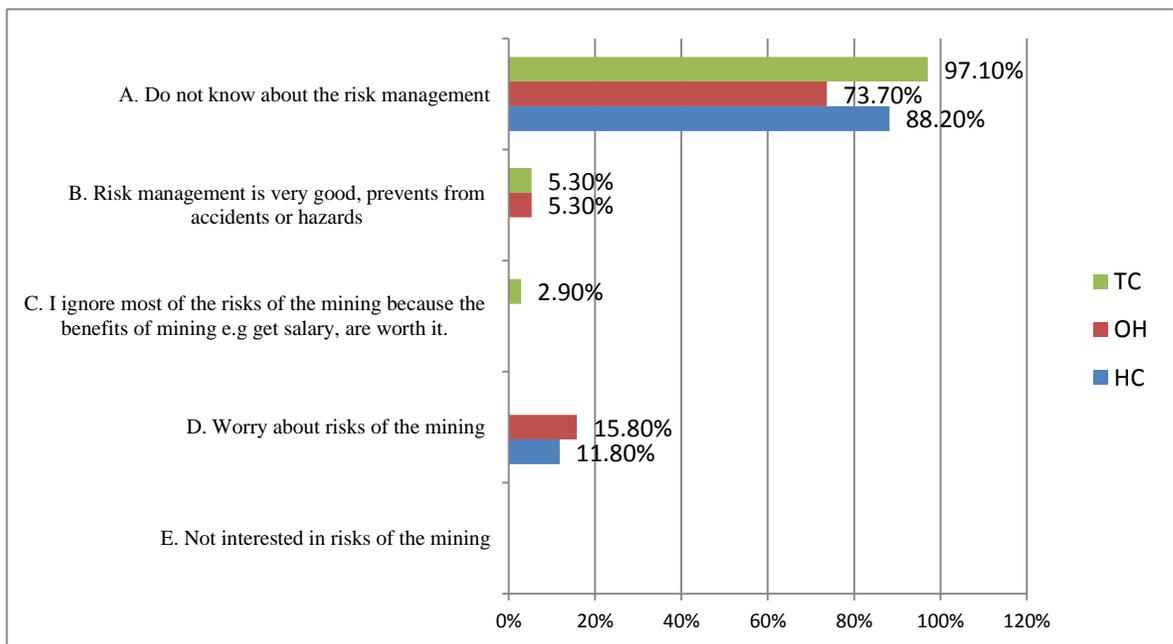


Figure 4.5 Answers about the risk management of G company

In Figure 4.4, most of the respondents did not get information about risks from G mining company. Only a few respondents of other herders got information about risks by mass media and other sources.

According to the Figure 4.5, most of the respondents did not know about the risk management of the mining company. Additionally, only the herders replied “Worry about risks of the mining”. Contrary, the town citizens replied “Risk management is very good”; “I ignore most of the mining because of the benefits of mining”.

4.3.3 Does trust affects risk perception of human health?

If trust was low it relates with risk perceptions (Siegrist et al., 2000). The relation between trust and risks on human health was tested using the answers of the quantitative group question 5. The result of single regression analysis is shown below.

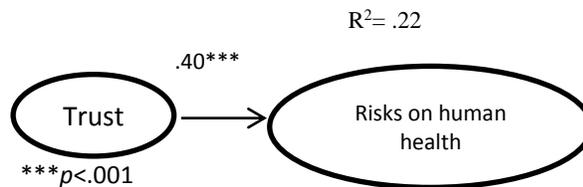


Figure 4.6 Trust affects risk perception

In The G site trust affected risk on human health.

4.4 Discussion of the The G site

4.4.1 Opinions about G mining company

The above mentioned results revealed that each respondent group showed different trust levels towards the three determinants. We wanted to know the reasons for these differences based on the respondents’ answers to the open-ended quantitative question 1 “What is your opinion about the mining company and its activities?” The responses were collected from 37 participants (herders close n=15, other herders n=8, and town citizens n=14). Correspondent Analysis (CA) was conducted for the answers of the quantitative question using KH coder software (Higuchi, 2015) for quantitative analysis and the result of plotted diagram is shown in Figure 4.7. The answers were classified into the respondent groups: town citizens, herders close and other herders, and the groups were used as the variables in the analysis. In order to select the words close to each variables, the frequencies of the words were counted. Thus, in this diagram, the words with the greater number of frequencies are usually plotted close to each variable. However, if any of the words were used by other variables, they are influenced and plotted between these variables (Greenacre & Blasius 1994, p.12).

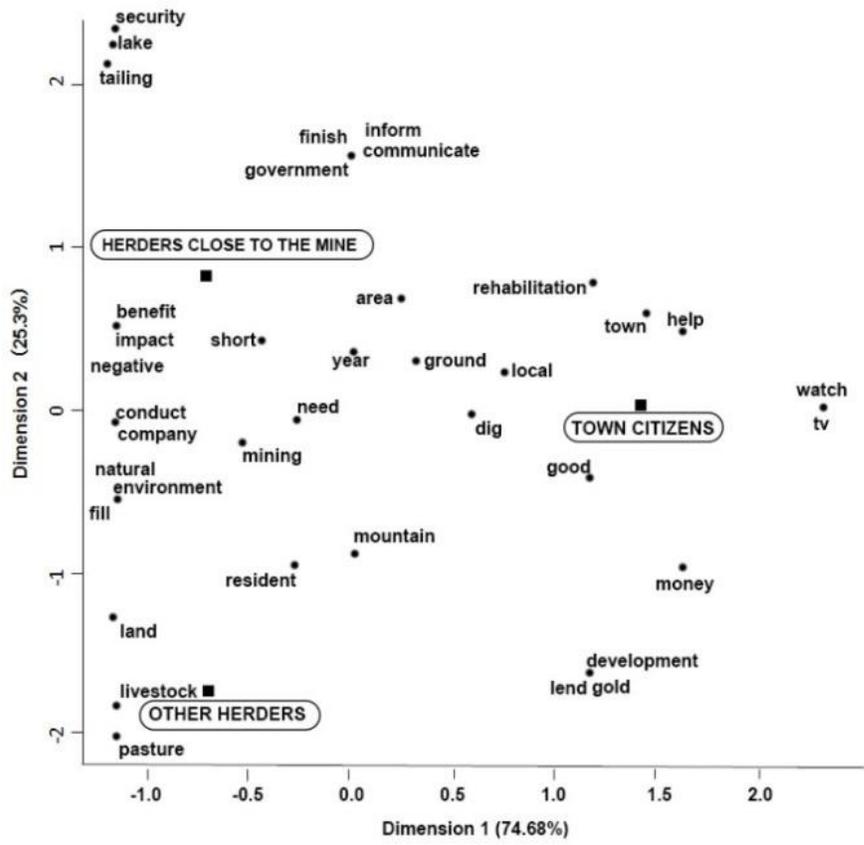


Figure 4.7 Result of CA analysis: Respondents’ perception of mining risks in general by the words with greater frequencies.

In the diagram, the dimension 1 corresponds to 74.68%. Through the axes of dimension 1, the herders close and other herders are on the left that share similar opinions, while the town citizens is on the right with completely different opinions than the herders. The dimension 2 corresponds to 25.32%, not much information is given.

In order to find concentrated opinions of each variable, we referred to the original answers and searched for connections between the words in the diagram. These words in the sentences are as follows by each variable. The variable herders close: “The mine lasted for too *short* a period; there was no *benefit* for the country/local area”; “The mine might have *negative impacts* on the environment”. The variable other herders: “We want the *pastureland* back for *livestock*”. The variable town citizens: “They *helped* financially and lent *money* for residents”; “They did *good rehabilitation* on the mined area that we watched on *television (TV)*”.

4.4.1.1 Positive perceptions

The town citizens had high trust in the mining company, which correlated positively with the determinants of motivation and environmental protection. Some town citizens answered to the open-ended question about the environmental protection of the company positively, stating, “The company is good at restoring the mined-out areas, which was broadcasted on local TV” (4 residents of town citizens). Regarding the company’s motivation to care about the area, the participants responded, “They helped financially and had a fund to support the businesses of the residents.” This result is consistent with Dougherty and Olsen’s (2014) study which indicated that “Trust in a spatially distant institution is institutional trust. People with this type of trust are not influenced by the emotions of surrounding people and usually support the mining operation.” In addition, during the field survey, the town citizens mentioned that the company constantly distributed brochures and monthly newspapers in the towns. We assume that the town citizens’ perceptions of the mining company were based mainly on two factors, (1) the company’s activities in the towns, and (2) the information about the mining operation and environmental protection measures distributed by the mining company in the two towns.

4.4.1.2 Perceptions of negative environmental effects

The herders close had low trust in the mining company. The mean value of ability of the herders close was slightly higher compare to the two other respondent groups; thus, we assume that ability did not affect the low trust of the herders close (Table 4.2 in Section 4.2.2). Therefore, the low trust was the result of the determinants of environmental protection and motivation. On the open-ended question, the respondents expressed negative perceptions of environmental changes due to the mining activity based on their personal observations (the other herders had same opinions).

There was a beautiful hill, but now it has been ruined (Respondents: 2 herders close). The mining operation greatly damaged the natural environment (Respondents: 2 herders close, 1 other herder). The seven lakes have been dug in the [open] pit mine, which cannot be filled back, even after the rehabilitation is finished (Respondents: 3 herders close, 1 other herder).

In addition, environmental effects of some facilities at the mine site were perceived as follows: *“The waste water with cyanide in this lake [the tailings dam] may be penetrating and polluting ground water (Respondents: 2 herders close). The mine uses a lot of ground water*

through many ground water wells. Now soil in the pasture land has become dry” (Respondents: 4 herders close).

Herders who lived close to the mine site had negative perceptions that have resulted in low trust (Nakayachi et al., 2014). Their responses differed significantly from those of the town citizens. Before the mining operation started, the herders close used the land to graze livestock or cultivate wheat crops in the valley. During the mining, the valley has changed significantly as a result of digging the hill and forming some lakes. These herders expected to use the land after the mining will be finished, but in the meantime, they observed severe environmental damages. Thus, people living near the mine sites are more likely to notice more environmental problems compared to the people who live further away. This should be considered in environmental decision-making processes (Norton and Steinemann, 2001). Changing landscape in rural areas by using natural resources leads to contradicting opinions; therefore, concerns of the local residents should be taken seriously (Soini et al., 2012). This finding is consistent with the results of study on environmental perceptions of people living in proximity to natural environment, showing that residents who lived close to a creek were concerned more about water quality compared to residents who lived further away (Brody et al., 2005). Thus, the mining company should introduce about their environmental protection measures to the herders living near the mine in order to maintain trust.

Related to motivation, the herders close did not respond much. Instead, some herders close expressed their dissatisfaction with economic benefits of the mining operation: *“The mine was there for too short; it provided no benefit to the country/local area” (Respondents: 3 herders close, 1 other herder).* *“The company dug tens of tons of gold but nothing has changed for us” (1 herder close).*

The unmet expectations of economic benefit among herders living close to the mine site resulted in low trust (Lewis and Weigert, 1985). They did not satisfy the mining company’s financial contribution in the two towns. Local residents of this case study expected benefit from the mining operation like Erdenet mine. Local people’s image about economic benefit of a mining operation resembled to the state owned Erdenet copper mining company and process plant which has being exporting abroad copper concentrates gaining approximately 30% of total state revenue since 1970s. However, benefit from G mining operation did not meet the expectation. The trust decreased when their expectations failed. These findings are consistent

with the study about “The lack of trust changes the way people make decisions about important issues” (Luhmann, 2000).

The residents supported the current mining activity and did not resist during the mining operation for a decade. However, during this field survey, some residents mentioned that they did not want G mining company to start a new mining activity (1 respondent each from herders close and other herders), although the preparation was underway in one of the soums. This is because trust had declined and it was sign of opposition. The company’s efforts to contribute financially in the local area and engage in active communication with local community did not translate into long lasting successful relationship in the future. “Building trust is not always easy, and once lost, it becomes even harder to regain” (CSIRO website, 2017).

4.4.1.3 Far from the mine site

The other herders had, had neutral trust, possibly due to living far away from the mine site and not getting the information about the company. They were concerned mainly about the land, saying “*We want the pasture land back for livestock grazing*” (3 respondents of other herders). The mining area was important to the herders for livelihood as a pasture land. Few respondents had the same opinions about the environmental effects of the mining activity as did the herders close, but these responses did not influence other herders’ trust level significantly.

4.4.2 Trust and risk perception

In the G site, trust affected risk on human health. In the answer of open-ended question a herder close perceived the risk of that “*The water in lake [tailings] contains cyanide. If the dams brake, the water would flood into surrounding area causing soil pollution*”. There was not information from G company how they reduced risks and providing safe environment. The respondents did not mention visible environmental problems but mining operation induced risk perceptions for the local community.

Chapter 5. The U site : the community with work and non-work relations with the company

In the second part of this study we conducted survey among the local communities about trust in Bor-Undor fluorite mining company (below U company) which is located in Bor-Undor soum of Khentii Province in Mongolia. The same questionnaire sheets were used for the surveys in the two sites. The same types of the analyses have been conducted for the data at the U site and the G site.

5.1 Study site U

5.1.1 Study site: Bor-Undor soum, Khentii Province

Bor Undor soum of Khentii Province is located about 330 kilometers in south east from the capital city Ulaanbaatar. The area is ecological zone of desert steppe which is in the north edge of Gobi desert. Annual average precipitation is from 150 mm to 200 mm (National geographical atlas of Mongolia, 2009). Sources of water and grasses are less, thus the number of nomad herder families are fewer than in Selenge Province.

Mongolia and Russian Government established a joint mining company to mine and process fluorspar ore in 1983. Meanwhile, a town Bor-Undor was built in about 10 kilometers distances from the process plant. Therefore, about 32% of labor age of the town population worked at U company at the time of the survey. The land area of the soum is 144 km², and it is small compare to other soums in Mongolia, because it includes only the mine sites, the town, the process plant, railway station and a few nomadic herders living in grassland area. In 2000s several small mining companies started operation in the territory of Bor-Undor soum. In the town, the government office of the soum, the apartments for living, and schools for children, hospitals, a cultural palace and other facilities were constructed.



Figure 5.1 Around the town, landscape is steppe and Gobi region



Figure 5.2 A part of Bor-Undor town

Demographic information of the soum is shown in Table 5.1.

Table 5.1 Information about Bor-Undor soum

Land area (km ²)	144
Population	9,119
Male	4,468
Female	4,651
Children (under 16 years)	2,280
Adults	6,839
Labor age	5,371
Employed people	4,220
The number of herder population	385

5.1.2 The mine and the process plant Bor-Undor mining company

Mongolia and Russian Government established Bor-Undor LLC of fluorite mining company to mine fluorspar ore and process plant in 1983. This is one of the several mining companies of Mongolia-Russian joint venture "Mongol Ros Tsvetmet" LLC. Bor-Undor LLC has been mining fluorite ore in the underground mine "Bor-Undor" and the open pit mines "Khukh Del", "Tuv Unegt" and "Zuun Unegt" in Airag of Dornogobi Province. The fluorites ore are extracted at these mines and processed in the "Bor-Undor" process plant for the final products of fluorspar acid concentrate (FF-97, FF-95) and metallurgical fluorspar (FK-75). The

process plant is the largest fluor spar concentrate processing plant in Mongolia. At peak production this was a leading fluor spar mining and production company which was ranked at 4th in the world in 1980s after China, Mexico and South Africa. At that time production, 1700 people worked at the company.

In addition to the fluorite, iron deposits existed in the area. The company started mining of iron ore in 2011 and production of dry and wet iron ore concentrate started in the same process plant in August of 2013. The iron ore mine is located at an area called Bargiltai in the territory of Bor-Undor soum (Figure 5.5).



Figure 5.3 The process plant and office



Figure 5.4 Entrance of the underground mine



Figure 5.5 “Bargiltai” the open pit iron mine
(photo from the website of Mongol Ros Tsevetmet LLC)

However, fluorite underground mine and the process plant were temporarily ceased operation due to difficulty in the market sell at date of the survey in August 2014. About 400 workers had compensations equal to 60% of salary and waiting for the recovery of the operation. In 2016, production of U company recovered. In third quarter of year of 2016, 105.28 thousand tons of ore was extracted from underground and open pit mines and 25.50 thousand tons of

fluorspar acid concentrate and metallurgical fluorspar were exported to China, Russia and Ukraine for aluminium and uranium processing plants, chemical plants, freezer production etc (Web site of Mongol Pos Tsevetmet LLC, accessed 26 April, 2018).

In Bor-Undor town, facilities are located: two secondary schools, three kinder gardens, a cultural centre, a local court, a police, a food factory. The mining company broadcasts about their activities on the local television. The company introduce their activities at local meetings as well. The company planted trees in the town. In the process plant a lot of water is used and lastly it is diverted to the tailings facility (Personal communication. Interview with U company’s official in charge of Environment and Public affairs, 11 November, 2014).

5.1.3 Questionnaire survey respondents in The U site

The same questionnaire sheet as in the G site was used for the survey. Total 44 samples (among 6 nomadic herders) were collected. Due to small number of the herders it was not possible to divide the respondents same as at the G site. Instead, the respondents had different work relations with the company; some of them worked or used to work, others did not work at all at the mining company. Thus, the respondents were divided into two groups for the quantitative analysis as: with work relation and without work relation. The answers of the herders were used only for the qualitative analysis.

Table 5.2 The respondent groups at The U site

	All	With work relation	Without work relation
Herders	6		
Town citizens	38	22 (50%)	16 (36%)
All	44	25 (57%)	19 (43%)

*Note: With work relation: Work or used to work at the mining company
Without work relation: Did not work at the mining company*

5.1.4 Excluded the missing answers of the samples of The U site

For the quantitative questions about evaluating trust and the determinants, mean value was calculated from the answers of two questions in each item. When there was a “Do not know” answer it did not have evaluation capability; for example if two answers had 4 and 0 scores, mean is 2, however, the answer “Do not know” cannot give evaluation about the company. Thus,

we excluded the respondents with missing answers “Do not know”. Therefore, 38 samples were analyzed out of total 44 samples.

In other analyses all the original 44 samples were used such as other quantitative questions that did not combine two questions and the qualitative data of the open ended questions.

5.1.5 The reliability coefficients Cronbach’s alpha

For each determinant, the correlations between the two items were calculated to determine the Cronbach’s alpha reliability (Cronbach, 1951). The values were as follows: ability ($\alpha=.64$), motivation ($\alpha=.63$), environmental protection ($\alpha=.83$), and trust ($\alpha=.59$). The coefficients were moderate. Thus, the mean value of the two items measuring each element was used for further analyses.

5.2 Results of the trust levels and the determinants of trust in The U site

5.2.1 The determinants of trust

In order to define which determinant affect trust in the U site, the correlations between the variables were tested (Table 5.3).

Table 5.3 Pearson’s correlation coefficients between the variables

	Ability	Motivation	Environmental protection
Trust	-.04	.84**	.63**
Ability		.17	.18
Motivation			.67**

** $p < .01$

According to the Pearson’s correlation coefficients in Table 5.3, the correlations were high between the variables trust-motivation, trust-environmental protection and motivation-environmental protection. In this case the multiple regression analysis is not suitable to test the model in this study because high correlations between the variables will influence within the model.

In this case we use the result of Pearson’s correlation coefficient to illustrate the relations between trust and the three variables as shown in path diagram on Figure 5.6.

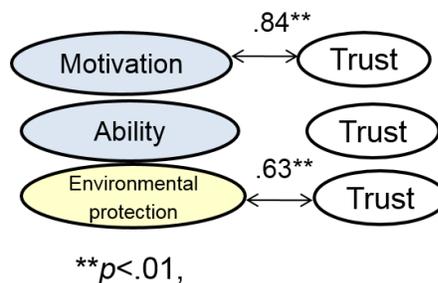


Figure 5.6 The relation between trust and the determinants using Pearson correlation coefficient

According to the result, the respondents' perception of motivation and environmental protection positively related with trust, while perception of ability did not related with trust.

5.2.2 Trust level differences between the respondent groups

Trust was positively related with the two determinants, as indicated in Figure 5.6. The mean values of the three determinants and trust are shown in Table 5.4.

Table 5.4 Mean values of each element and trust by the respondent groups (n=38)

Items	Trust	Ability	Motivation	Environmental protection
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
All respondents	3.3 (1.28)	3.67 (1.22)	2.80 (1.28)	2.47 (1.29)
Respondent groups				
Town citizens without work relation (n=11)	2.86 (1.58)	4.18 (0.64)	2.50 (1.18)	2.41 (1.41)
Town citizens with work relation (n=21)	3.57 (1.15)	3.60 (1.25)	3.00 (1.29)	2.55 (1.32)
Herders (n=6)	Too small sample, not possible to compare			

About all respondents, ability of the mining company was evaluated at highest rate, whereas environmental protection had the lowest rate among the determinants and trust. This tendency was repeated by the two respondent groups if we see mean value separately. The number of samples and the value of variances were not equal in the responses of the two respondent groups, thus statistically significant differences (e.g. conduct *t* test) between the groups did not measured.

5.2.3 Relation between trust and the determinants for each respondent group

In order to investigate the associations between the determinants and trust we computed Pearson's correlations between trust and the three determinants for each respondent group, as shown in Table 5.5.

Table 5.5 Correlations between trust and the determinants by the respondent groups.

Respondent groups	Items	Ability	Motivation	Environmental protection
With work relation	Trust	0.07	.84**	.54**
Without work relation	Trust	-0.2	.87**	.77**

** $p < .01$

According to the table above, trust of the two respondent groups in the U site had similar tendency to the determinants. Specifically, trust of both respondent groups significantly correlated with motivation, and environmental protection.

5.2.4 Information communicability

How does the company's information provision effect on trust levels? For this a quantitative question "Do you agree with a statement: The company provides information to the local residents?" was used. The answers had options: not at all, rarely, seldom, often and very often.

Result is shown on Figure 5.7. We assume that, the respondents, who worked at the mining company knew about the activities of the company. Most of the respondents without work relation replied that they did not receive information from the company.

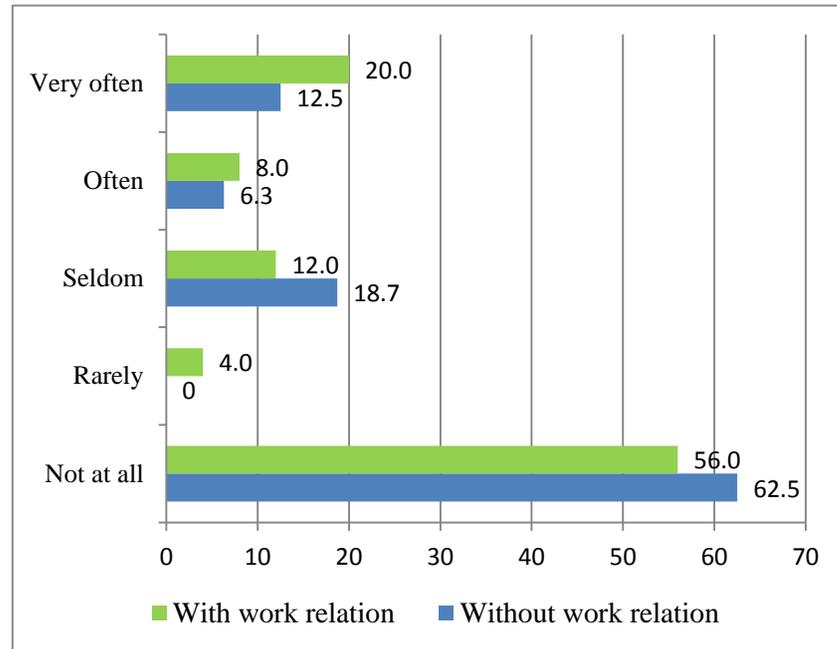


Figure 5.7 Information communicability of each respondent group (%)

5.2.5 Defining salient value of the respondents

Salient value similarity (SVS) was defined for U company asking the respondents same qualitative question about the important items for conducting long time mining operation. The respondents could answer up to three answers in their priority order and 35 people responded for this question out of total 44 people (79.5%). Only the first answers were selected to determine SVS. The answers with similar meanings were coded into a group as shown below on Table 5.6.

Table 5.6 Define the salient value: The coded answers.

Coded answers	Number of responses	Percentage (%)
A mining operation should continue without cease providing reliable salary for the employees	14	40.0
Protect natural environment and rehabilitate the mined land	11	31.4
Provide safe working condition that the workers would not have health problem.	5	14.3
Others (e.g. Need highly professional staffs)	5	14.3
Total	35	100.0

According to the responses of the participants, the highest rate of the response expressed the speciality in this site that the mining company should continue operation to provide salary for the workers as a salient value. The second in the rank, protection of natural environment and rehabilitation of the mined area were mentioned as a salient value. In the case of G mining company, the highest rate of salient value responded as the protection of natural environment and rehabilitation of the mined area in order to continue long time mining operation.

5.3 Results of risk perceptions and relation with trust in the U site

5.3.1 The respondents' risk perception about a mining operation

The respondents' perception of mining risks was asked by the qualitative question 3 as it was mentioned in Section 3.1.1. The open-ended answers were classified and following five main categories were found.

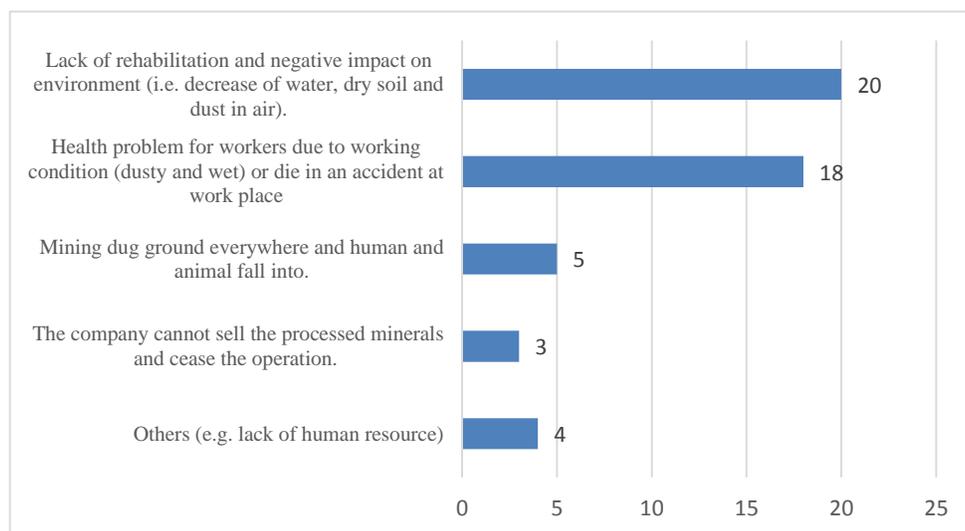


Figure 5.8 Classified answers about perception of mining risks at the U site (number of responses)

According to Figure 5.8, the respondents in the U site perceived risks of mining operations as negative impacts on natural environment, health problem for workers, and fatal hazard in a mine site.

5.3.2 Knowledge about risk management of U mining company

Results of quantitative question 3 and 4 as mentioned in Section 3.1.2 is shown below.

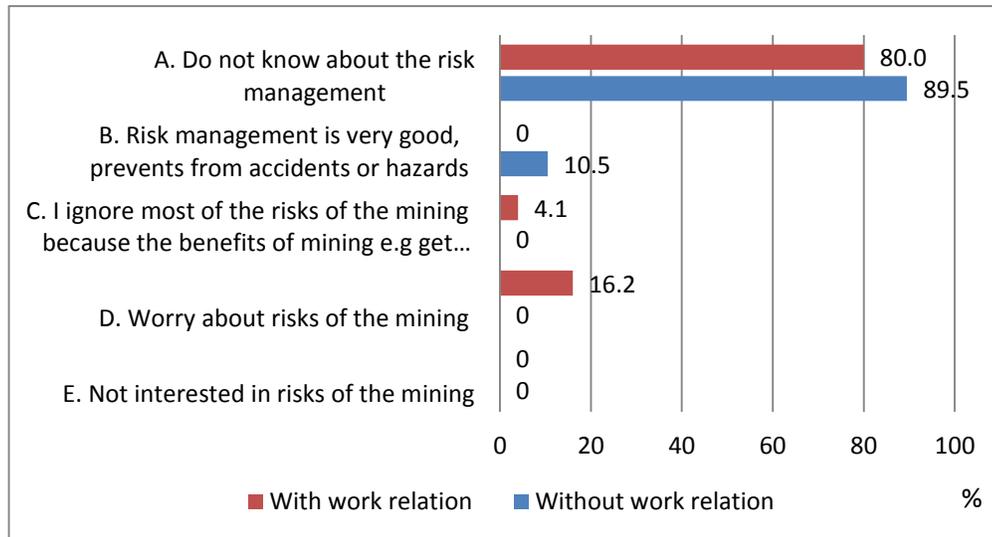


Figure 5.9. The U site: What do you think about risk management of the company?

According to Figure 5.9, most of the respondents did not know about the risk management of the mining company. Additionally, the respondents without work experience replied (10.5%) “Risk management of the mining company is very good”. Contrary, the respondents with work experience replied “We worry about the risks of mining operation” (16.2%). However, some of the respondents with work experience responded that they “Ignore the risks of mining because of the benefits of mining” (4.1%).

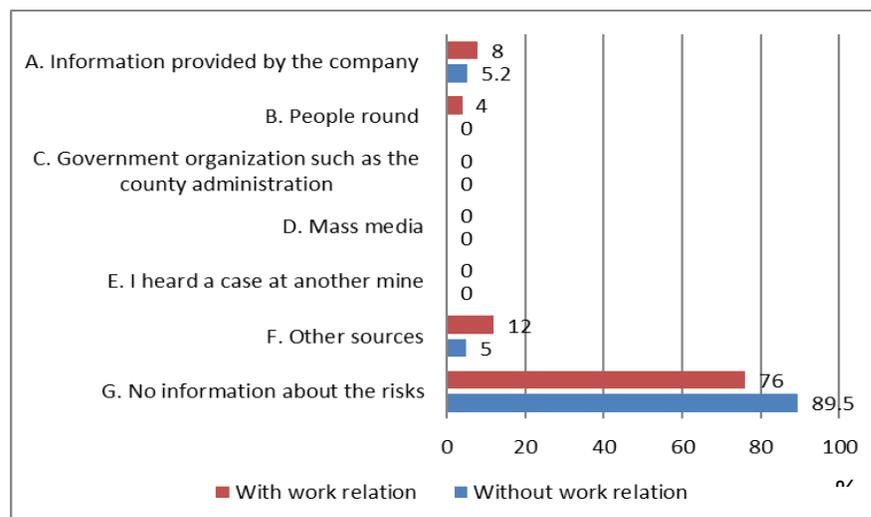


Figure 5.10 Answers about risk information from U company

According to Figure 5.10, most of the respondents did not receive information about the mining risks.

5.3.3 Does trust affects risk perception of human health?

If trust was low it relates with the risk perception (Siegrit et al., 2000) which means people would feel risks from the mining activities. The relation between trust and risk on human health was tested using the answers of the quantitative group question 5. The result of Pearson's Correlation coefficient is shown below and there was no correlation between the variables.

Table 5.7 Pearson`s Correlation coefficient between trust and risk on human health

		Risk on human health	Trust
Risk on human health	Pearson Correlation	1	.080
	Sig. (2-tailed)		.546
	N	59	59

In the U site, trust of the respondents did not correlate with the risk perception of mining operation on human health.

5.4 Discussion of The U site

5.4.1 The respondents` opinions about U company and discussion

The respondents' opinions about the particular U mining company were asked using a question "What do you think about the mining company and the mining operation?" The open-ended answers were classified by the meanings and the result is shown on Table 5.8.

Table 5.8 The respondents` opinions about U company: The coded answers (n=35)

Coded answers	Number of responses
A. Environmental impacts and rehabilitation, including:	Total 30; among
1. Rehabilitation is inadequate on the mined land during all the years of the mining operation.	15
2. Springs have dried out and water sources have decreased.	7
3. Dust pollution is caused in the air along the ore transportation auto road, thus lung of livestock were sick.	6
4. Dug ground is dangerous that human and animal fell into it.	2
B. Wish the company continue operation. Recently they cannot sell the processed fluorite.	6
C. Occupational health and safety for the workers, need to be improved:	5
D. After working tens of years the workers in the underground mine and the process plant have health problems.	
E. Others	9
The company planted fruit trees in the area.	

During the classification of the answers eight main meaning were found. Four of these related to environmental impacts of the mining operation and rehabilitation of the mined land.

There are little numerical differences in mean value in terms of trust and the three determinants between the two respondent groups: with work relation and without work relation at the mining company. Therefore, the responses of all respondents will be discussed in this section regarding trust and the three determinants. If we consider the tested model of trust, the result in The U site revealed that motivation and environmental protection related with trust positively, ability did not relate with trust. We will discuss here these results.

Respondents' perception of motivation related to trust positively which was expressed by the questions about the company's concerns related to residents and fair attitude of the mining company.

By mean value, ability of the mining company was evaluated at highest rate among the determinants. We assume this is because the skills of the workers' in the mining company were evaluated in ability. However, ability did not have correlation with trust, which means the respondents were not interested in U company's technological regimes, modern equipment and the worker's skills to trust. However, some respondents raise concerns about health and safety of the working condition: *"About 30 years the company uses same old machineries. Thus, work places in the underground mine and the process plant is very dusty which is bad for the worker's health. Many workers retired at young age because of health problem (5 responses). "The company could not sell the processed fluorite in last 2 years. So, sometimes there is no job (6 responses)"*.

The new determinant environmental protection related trust. The biggest concern of the respondents in The U site was about the environmental impacts and rehabilitation of the mining company according to the quantitative answers in Table 5.8. Especially, the rehabilitation on mined lands was not sufficient during 30 years mining operation. Further, negative environmental impacts from the mining operation were mentioned about dried out springs, dust pollution along the auto road from the mine site to the process plant and dug ground was dangerous for health and lives for human and animals.



Figure 5.11 Piled earth everywhere, this means lack of rehabilitation



Figure 5.12 Ore transportation vehicles caused dust pollution in the steppe



Figure 5.13 Dug ground were dangerous for falling into human and animals



Figure 5.14 Some residents perceive that springs dried out due to mining activity

Secondly, the respondents wish the mining operation continued without cease. In addition, from the real fact of the workers and people around them were concerned about occupational health and safety in the underground mine and the process plant because the workers had health problems such as lung disease due to dusty and wet working condition.

Although the nomadic herders` answers could not be included in the qualitative analyses, they responded six answers in this open-ended question. They said that “*The mining company`s rehabilitation process is not good during all these about 30 years*” (2 responses), “*Dust pollution in the pasture land is severe, thus livestock`s` lungs are sick*” (2 responses), “*Dug ground are dangerous that human and animals fall into it*” (2 responses).

Town citizens without work relation at the mining company shared same opinions with the herders about lack of rehabilitation on the mined land (6 responses). In addition, these town citizens expressed about decrease of water sources (2 responses). Despite these negative opinions, they were positive about the company saying that “*U mining company contributes a lot in the town*”, “*The company planted fruit trees*”.

Town citizens with work relation at the mining company responded 29 answers (58%) in this question. They expressed about lack of rehabilitation (7 responses), negative environmental impacts such as dust pollution in the air (4 responses), decrease of water sources (5 responses), problems with occupational health and safety (4 responses). Also they wanted the company operated stable that provided salary for the workers continuously (4 responses).

The respondents` salient values in The U site were “The continuous operation of the mining company providing salary for the workers”. This is connected to the reality that livelihoods of

the most respondents were dependent on the mining company. Moreover, the mining operation ceased temporarily, that time of the survey.

5.4.2 No relation between trust and risks, even risks were in real life

Trust did not affect risk on human health for the data of The U site. It can be explained by the following study. Trust is not likely to affect risk and benefit perception when people have knowledge about an institution and homogenous knowledge about the technologies (Siegrist et al, 2001). The workers of U company responded in the survey. They had wider knowledge about the mining company and operation. In case of the G site trust affected risk on human health. The respondents at the G site got the information provided by G mining company and had limited knowledge dependent on the information provided by the company.

However, it was surprising that trust did not affect perception of risks on human health, even though, risks on the worker`s health existed in reality. Some respondents mentioned that the workers at the mining company had health problems after working long time at the mine site and in the fluorite process plant. Why there was no relation between trust and risks, even risks were in real life? It might be related to the fact that the livelihood of the town was dependent on the mining company which means benefit from the company was important for the respondents. Therefore, trust might have affected by benefit perception.

5.5 Summary of the responses in the U site

The determinants: motivation and environmental protection related with trust positively, while ability did not define trust.

About the trust level, the town citizens with work relation had higher trust than the town citizens without work relation. The town citizens with work relation benefited from the mining company working and earning salary in the mine and the plant.

However, all three respondent groups expressed similar opinions about the mining company about lack of rehabilitation, negative environmental impacts, health problems working in the company and concern about stable mining operation.

Considering all the respondents, trust did not define risk perception on human health.

Chapter 6. General Discussion: Trust in a mining company and impacts on lives with comparison of the two sites

6.1 Comparison of evaluation about two mining companies

Local communities' trust in two different mining companies was studied here. G mine was a Canadian invested company with a decade lasting mining life. This company effectively communicated with the town citizens contributing financially with a monetary fund. Also they rehabilitated the mined area with responsibilities. The other U mine was invested by Mongolia and Russian Government and carried mining operation more than 30 years. Most of the respondents were concerned various negative impacts on environment.

In general discussion, the local communities' trust in these mining companies will be compared in relation with 1) Trust levels differences by similar respondent groups; 2) Comparison of the new determinant environmental protection; 3) Comparison of perception of negative impacts on environment.

6.1.1 Trust level differences in two sites

Trust levels have been compared in two sites by the responses of the respondent groups "Town citizens". In the G site the town citizens lived far from the mine site and in the U site the town citizens who did not work at the mining company is included here. Comparison of the trust levels by mean value at both sites is shown in Figure 6.1. At The G site trust of the town citizens was higher than at The U site. In the result of The G site the town citizens' high trust level was related to financial contribution in the town and information provided from G mining company. While, the town citizens in The U site had various concerns about environmental impacts of U mining company thus trust was low. In terms of motivation and environmental protection, the respondents at The G site evaluated more than 3, whereas at The U site around 2 points. Mean value of ability was high in The U site because the worker's skill was evaluated high.

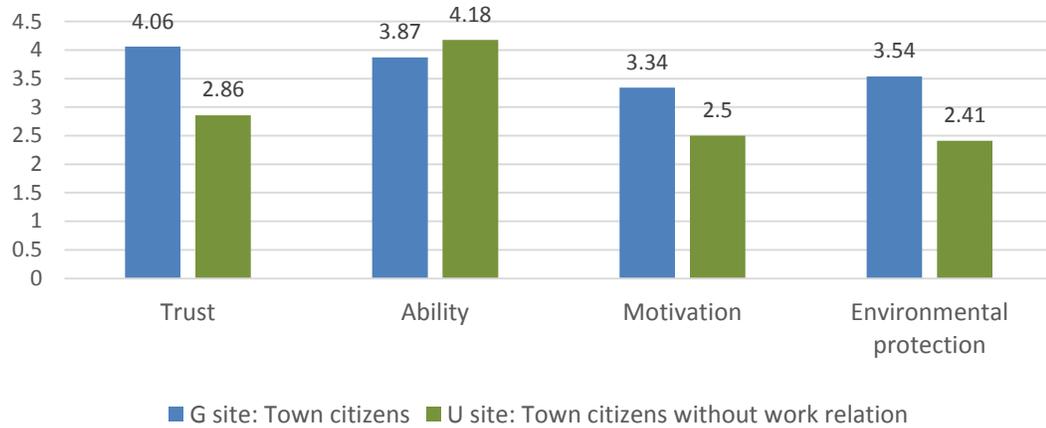


Figure 6.1 Comparison of trust and the determinants in the two companies by mean value

6.1.2 Comparison of the new determinant environmental protection

The new determinant environmental protection had different result for the two mining companies as shown in Figure 6.2.

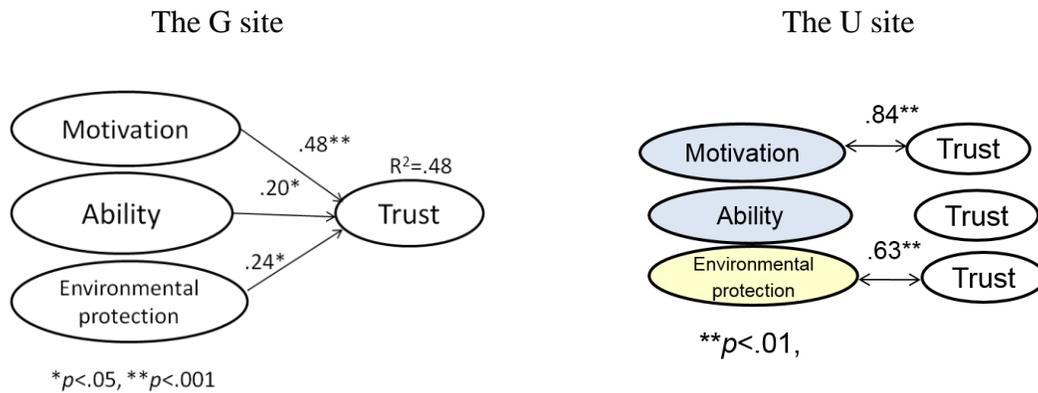


Figure 6.2 The effect of new determinant environmental protection in two mining companies

In terms of the responses about G mining company, the new determinant affected trust referring to high and low trust as following. The town citizens with high trust did not concern much whereas, the herders close to the mine site were unsatisfied about environmental changes and future impacts on environment after closer of the mining operation.

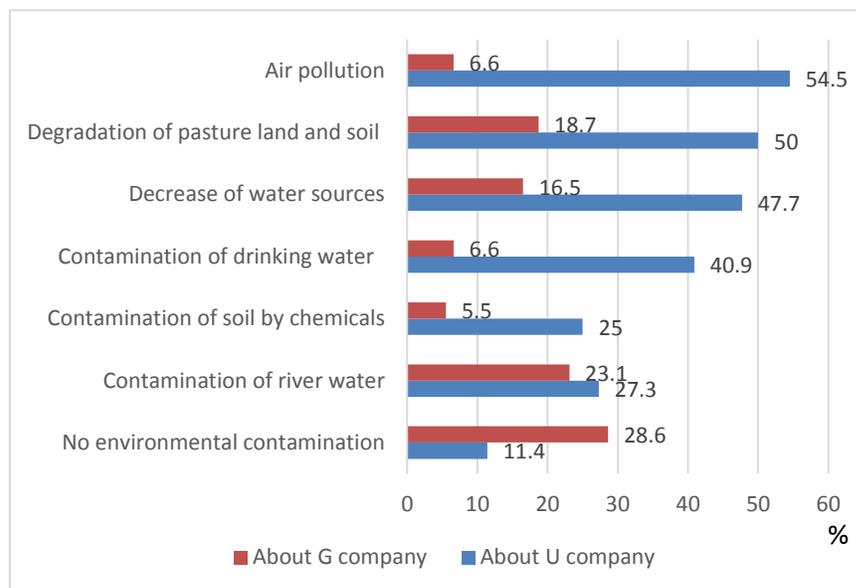
The responses about U mining company, the new determinant related to trust positively. This means the mining company’s commitment on environmental protection was not the reason of decrease of trust. Surprisingly, 64% of the respondents in U mine site expressed their concerns about lack of environmental protection and rehabilitation of the mining company

(Section 5.4.1). It matches with the outcomes of previous researches about: If a mining company offer long-term benefits to the region, local community trust and support the mining company, even though some residents are highly aware of the negative environmental effects (Prno and Scott, 2012; Moffat et al, 2014).

6.1.3 Comparison of perception of negative impacts on environment

The comparison of the results of perception of negative impacts on environment at G and The U site s is shown on Figure 6.3.

Figure 6.3 Perception of negative environmental impacts comparing two mining companies



About U mining company the respondents perceived more negative environmental impacts than the respondents in the G site. Particularly, the respondents of the U site perceived that the mining operation has negative impacts of air pollution, degradation of pasture land and soil and decrease of water sources with 55%, 50% and 48% respectively. In comparison, in the G site, the highest rate of the answer was 25% for contamination of soil chemicals.

6.2 Trust in a mining company and impacts on lives

6.2.1 Connection between trust and impacts on lives

As it was mentioned in the introduction section, the Parliament of Mongolia approves the laws and regulations, however, environmental problems are still caused because some mining companies do not comply with the laws and proper measures are not taken by authorities.

McIntyre et al., (2016) described that the causes of negative impacts on natural environment in Mongolia is related to “Inability to control the degree of environmental pollution by the authorities due to ineffective mechanisms for implementation of the laws and regulations”. This means legal enforcement system is weak, thus some mining companies cause environmental pollutions. Further, some mining companies neutralize the problems at present and escape from responsibilities. Because of economic advantages, the mining projects are powerful and they limit pastoralism by environmental conditions. In this situation it can lead to denormalization of pastoralism in the future (Evelien and Hendrik, 2017).

In this study we have defined the low trust at one site when we compared the trust levels in two mine sites (Section 6.1.1). The local people’s low trust was related to perceptions about environmental problems caused by mining operations, such as “Dug land is dangerous for lives”, “Drinking water sources decreased due to mining activities”. This result of the study has been described on the scheme in Figure 6.4 in connection of the stakeholders in the situation. If there was water shortage, the herders had to resettle to other areas searching for sufficient water and grassland for their livestock. Therefore, the local people’s voices in the study might be expressions of negative impacts on their lives as well as it might be pressures. However, the negative impacts on their lives have not been studied formally, thus in this place it is a prediction. Further, if the herders cannot find suitable place for normal lives they might surrender nomadic herding lifestyle and migrate to an urban area. Migration of nomadic herders is one of the biggest problems in current Mongolia (Ministry of Social Welfare and Labour Mongolia and UNDP, 2009) which is the reasons for the social problems of too dense population in the urban areas and poverty.

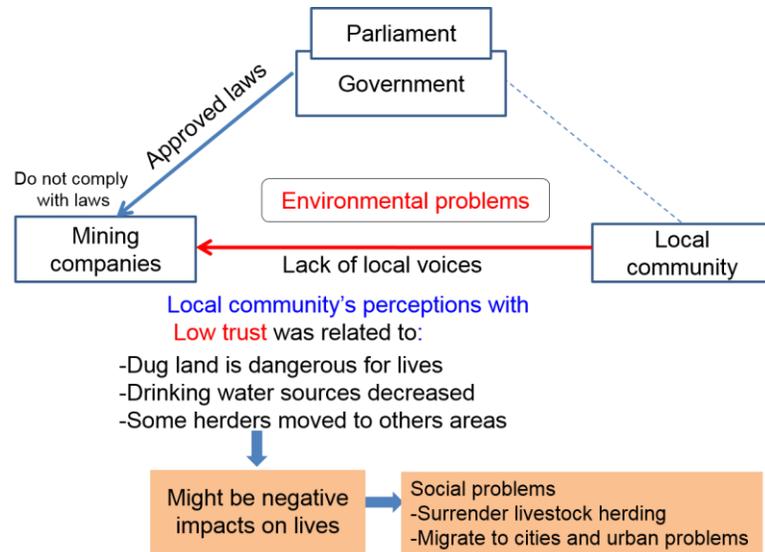


Figure 6.4 Outcome of the study: Low trust might be a sign of negative impacts on people’s lives

Those environmental problems might cause impacts on local people’s lives. Even it could relate to serious problems such as shortage of drinking water or unpleasant displacement. Unfortunately, either government organizations and mining companies do not consider what are the problems for local people’s lives. On the other hand, there is lack of a social system that local people’s opinions and perceptions studied on scientific base and further considered to solve existing problems. A report “Responsible mining in Mongolia (Cane et al, 2015)” stated that “Although herders are immediately affected by mining, they are often the least consulted groups by governments and mining companies across Mongolia”. Residents’ perspectives and rights are neglected and concerns sometimes have been ignored or downplayed by the subjects who are responsible implementing environmental policies and practices. In this meaning, there are needs to assess negative impacts on local residents’ lives from mining operations.

6.2.2 In order to maintain trust of local communities

Aiming long time, stable mining operation, mining companies have to maintain the trust in the local area, when local communities perceive environmental problems and trust was low. In this study trust in the two mining companies was defined mainly by motivation and environmental protection. In addition, mining companies need to consider salient values in the local areas, which were different in each case study (Figure 6.5).

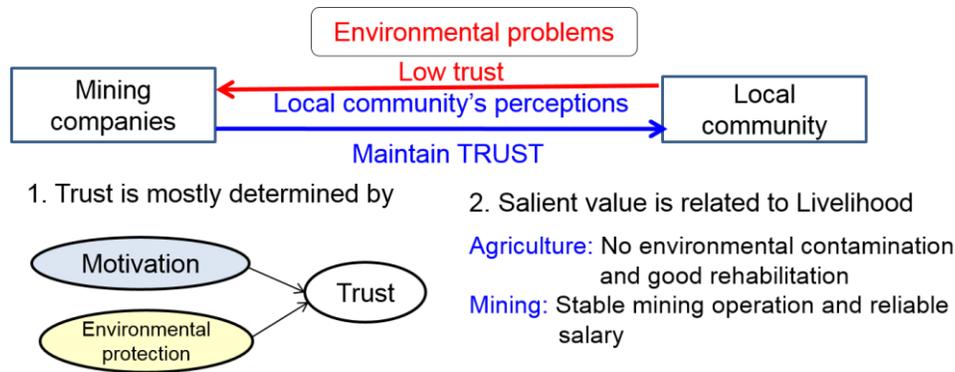


Figure 6.5 In order to maintain trust, the determinants of trust and salient values are important

As we found in the results of the two mining sites, motivation and environmental protection defined trust in both sites. In order to maintain trust of local communities, mining companies must consider these two determinants. Motivation referred the questions about “The company’s concern for issues related to residents” and “Fair treatment to any problem”. It was an important factor which evaluated the meaning “If a mining operation caused negative impacts on residents’ lives, the mining company takes serious measures to mitigate the impacts”. The determinant environmental protection evaluated the mining companies’ commitment to prevent from environmental problems. As it was mentioned in the previous section, low trust was related to environmental problems of the mining activities and that might cause impacts on residents’ lives.

In addition, trust can be stabilized when consider salient values of the local communities. In these two case studies, salient values reflected the livelihood in the area. Where livelihood consisted of agricultural activities, mainly pastoralism, salient values expressed condition in natural environment “No environmental contamination and good rehabilitation”, and where livelihood was dominant in mineral extraction salient value referred to “Stable mining operation and reliable salary”.

Mining industry and agriculture of local community are both important industries and should co-exist. Environmental perceptions or environmental problems of a mining operation that exist in real life are the main concerns of local communities. In McIntyre et al., (2016) the authors described that “If Mongolia aims economic strength by mining industry alongside sustainability of the herder lifestyles, effective governance mechanisms are required that should address present fundamental challenges”. The challenges included collect environmental

baseline data at pre-mining areas, monitor and exam mining negative impacts on water, soil and harmful land alterations.

In order to prevent from occurrences of environmental problems, it is crucial to build partnerships among the engaged stakeholders (Sharma et al., 2014) and “Involve communities in monitoring the environmental impacts” (United Nations Sourcebook, 2018). In Mongolia, one of the reasons of the government organizations cannot control the environmental problem is that mining companies are located in far distances from the settlements. For example, when river water was polluted, it would take quite long time for a local government to recognize it and exam the water quality and take appropriate measures to cease the pollution. It might be effective for monitoring if the local government communicate and corporate with nomadic herders. Nomadic

herders observe natural environment in daily lives and they have deep knowledge about surrounding. In addition to this knowledge, scientific methods of pollution monitoring should be applied. Local communities can do it after only basic training with the potential for a participatory monitoring committee (McIntyre et al, 2016).

6.2.3 Proximity factor: Perceptions of the herders residing close to the mine site

The herders who live close to the mine site have different perceptions than other local residents. These herders used the land as a pasture land grazing their animals inheriting for generations from their ancestors. As it was mentioned in the open ended answers, their main concerns were the changes in natural environment during the mining operation and the doubts about recover of the land as it was used before the mining started.

As previously mentioned about G company, the company spent huge amount of money to have good relation with local area as well as made a lot of effort to protect and recover natural environment. Even though, from the results of questionnaire survey the herders who lived close to the mine site had low trust compare to other two respondent groups.

This is consistent with previous studies about “Proximity factor” that was mentioned in Section 2.3, which expressed that “Residents who live close to a natural resource are possibly more concerned with its environmental quality”(Brody et al., 2004).

From this study we have found nomadic herders have deep sense to natural environment. Therefore, mining companies have to study the perceptions of residents who live close to the mine site and should take measures in order to maintain trust in the company.

6.3 Trust in a mining company in Mongolia and other countries in the world

Firstly, in the case of U mining company, there is a similar example in the study of Horowitz (2010) about trust of employee in a mining company. Some of the town citizens with work relation at U mining company had high trust. Horowitz (2010) described that high trust was a result of perception of benefit and positive perception about environmental protection. Some employees had high trust in the nickel mining company with hope of long-time relationship in the company that would have advantages of input of money for development of infrastructure and higher standards of living for their lives as well as for the whole country. They expected that the company could reduce negative impacts on environment and risks which might cause strain on the marine resources using appropriate technologies in the mining. In this meaning, perception of benefit of the mining operation was greater than the perception of risks faced for ecological damages. Some literatures defined this risk perception as “When people trust in an institution, benefit is perceived more than risks” (Frewer et al., 1996; Siegrist and Cvetkovich, 2000).

Contrary, other employees joined a resistance group of the mining company because they perceived that there will be negative impacts and risks on marine resources affecting the residents’ livelihood. They perceived short-term relationship with the mining company and valued more kinship to their ancestors, families and relatives. They did not view the economic benefit of the mining operation as long lasting since the marine resources were important for their livelihood as early time. These people doubted about appropriate environmental measures of the company that would not cause negative impacts on the marine resources. This is related to the study of low trust resulted in high perception of risks (Siegrist and Cvetkovich, 2000).

Secondly, in the two case studies the respondents expressed concerns about environmental problems in relation of pasture land and livestock husbandry. Agriculture including livestock husbandry and crop cultivation possesses important role in the economy of Mongolia. Also it has ancient history back to date of 1300 years before the century. If we compare Gross Domestic Production (GDP) of the two countries, the agriculture has more important role for Mongolia than in Australia. Specifically, agriculture represented 12.74% of GDP in Mongolia in 2016 (The World Bank) and 2.4% of GDP in Australia (Moffat et al., 2014).

The mining industry represented 9.6% of Australian GDP. Australians support the mining industry in the country which was resembled as the main “pillar” in Australian economy. A

nationwide survey with 5,121 participants, Australian respondents accepted the industry evaluating above the midpoint of the scale. The economic importance in the country was described as dependent on the mining industry.

Meanwhile, similar role has the mining industry in Mongolia with representation of 21.4% of GDP of the country in 2016. Therefore, Mongolian economy is dependent on both mining and agriculture as well as one third of population is nomad herders engaged in livestock husbandry. However, the difference between Australia and Mongolia is laying on the traditional agriculture of livestock husbandry.

Chapter 7. Conclusion

In these two case studies, we have examined the local communities' trust in two mining companies G and U. The determinants of trust were examined including motivation, ability, and environmental protection using a questionnaire survey. We assessed a new determinant of trust as the residents' perceptions of company's effort to maintain environmental protection.

In the G site, the determinants of trust significantly affected the trust levels. Specifically, the herders who lived close to the mine site had low trust, which was significantly related to their perception of the company's effort to maintain environmental protection. This respondent group was sensitive to environmental effects of the mining activity on the land, which they used before the mine started and hoped to use again after the mining operation finishes. On the contrary, the town citizens had high trust in the mining company, evaluating positively the company's motivation. Some other herders showed neutral trust that was not affected by any determinants. In addition, the company's communication, including the information dissemination, influenced different trust levels. Easy access to the information sources resulted in high trust among the town citizens while the herders with limited information had low trust. The result of SVS indicated that most respondents believed it was important to minimize environmental impacts for long lasting mining operation. The mining company's financial contribution to the area increased positive perceptions of the company; however, it is not the only factor that gained support in the area.

Several months after this field survey, the company encountered a resistance movement by some residents and a NGO against the new mining operation, which was under preparation. The protestors developed a slogan to protect a mountain, including head-water area and the historical tombs. Before the resistance movement, if the mining company gathered sufficient knowledge about the residents' low trust that disrupted the balance of power between the local community and the mining company, it might have prevented the resistance. Consistent with the initial intention to clarify the local community's trust in a mining company, this research identified the state of trust before the resistance movement.

About the U site, three determinants had different relation with trust. The respondents trusted motivation of U mining company while ability did not have connection with trust. The new determinant environmental protection related to trust positively, even though the respondents perceived more negative impacts on environment than in the G site. However, these

perceptions of the residents could cause any side effect for the mining companies. Therefore, U company should take environmental protection measures and rehabilitation on the mined land for satisfaction of the residents and for future life in the town after the mining closure.

The perception of benefit from the mining operation was dominant for the respondents in the U site. Specifically, the mining company had significant role for life in the town. Some respondents worked in the company and supposed to continue working for 20 years in the future and the town should profit as well. This case showed importance of perception of benefit to maintain trust. Literatures on successful mining operations indicate that the mining company can offer long-term benefits to the region and minimize negative environmental effects, even though some residents are highly aware of the negative environmental effects (Moffat et al., 2014; Prno and Scott, 2012).

In relation with trust in two mining companies, the local communities' concerns about environmental problems have been revealed in this study. Some of the respondents live depending on environmental, thus environmental problems might have caused negative impacts on their lives. The biggest issues revealed in this study is local people's voices have not been considered by neither the authorities nor mining companies.

As it was mentioned in Section 1.2, livestock herding is the main activity in agriculture in Mongolia. In order to co-exist mining companies with local communities which are engaged in agriculture, mining companies should conduct surveys on perceptions and opinions of local communities which will be useful source of local knowledge to maintain trust in the local area. The accumulation of positive perceptions over time would lead to long lasting trusting relations (Nakayachi 2008, p.69).

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Appendix 1. Questionnaire sheet of the survey in English

Questionnaire survey in Mongolia

August 2014

This questionnaire survey was conducted to determine the trust level of local community in the particular mining company.

Survey areas: Two soums in Selenge Province, and Bor Undor soum of Khentii Province, Mongolia

Could you choose a mining company which is operating in the county and you know well.
Name of the company :

Reason that chosen this company:

1. I know about this mining company in our soum (county)
2. (for the herders) I live or our livestock pasture land is close to the mining company
3. I am or a family member(s) work now /used to work at this company
4. We sell/used to sell products to the company (e.g diary, meat)
5. Other:

Could you answer the question sharing your opinion about only above the company you mentioned.

Some answers will be 5 scores that would meet the agreement with the statements. If you do not know (DNK) you can answer 0.

5. Strongly agree	4. Agree	3. Neutral	2. Disagree	1. Strongly disagree	0. Do not know
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Other questions have optional answers.

Questions that used in the thesis

1. Ability

Q1. The operation is conducted following the technological regime using modern machinery.

5. 4. 3. 2. 1. 0.

Q2. Workers are highly skilled and professional in this company.

5. 4. 3. 2. 1. 0.

2. Motivation: Seriousness

Q4. The company is very conscious about the issues related to residents.

5. 4. 3. 2. 1. 0.

Fairness

Q14. The company treats all problems fairly.

5. 4. 3. 2. 1. 0.

3. The company's effort for environmental protection (Environmental Protection)

Q3. The company is very serious about environmental problems.

5. 4. 3. 2. 1. 0.

Q9. Conducts environmental monitoring and controls environmental contamination.

5. 4. 3. 2. 1. 0.

4. Trust

Q12. Residents respect the company.

5. 4. 3. 2. 1. 0.

Q13. Residents rely on the company.

5. 4. 3. 2. 1. 0.

5. Information communicability

Q11. The company informs the information related to the local area e.g a well will be drilled in the area, frequently to the residents.

1. Never 2. Rarely 3. Seldom 2. Often 1. Quite often 0. DNK

6. Concern about environmental problems as well as residents' safety.

Q19. What do you think about environmental impacts of the mining operation by this company.

- 1. Decrease of water sources a. No b. Yes (The reason you think)
- 2. Contamination of drinking water a. No b. Yes (The reason you think)
- 3. Contamination of river water a. No b. Yes (The reason you think)
- 4. Degradation of pasture land and soil a. No b. Yes (The reason you think)
- 5. Contamination of soil by chemicals a. No b. Yes (The reason you think)
- 6. Air pollution a. No b. Yes (The reason you think)
- 7. No environmental contamination
- 8. Do not know

7. Opinion about the company: Q20. What is your opinion about the mining company? (open answer)

8. Questions to ask the residents' level of familiarity with mining risks

Q18. What is risks of a mining operation? (several answers are possible)

- A. I think risk is: 1.
- 2.

B. Do not know about risks of a mining operation

Q22.1 There is no negative impact on human health from the mine and the process plant. Do you agree?

5. 4. 3. 2. 1. 0.

Please specify if your answer is 1 or 2 :

Q23. What do you think about risk management of the company. (please choose 1 answer)

- A. Do not know about the risk management
- B. Risk management is very good, prevents from accidents or hazards
- C. I ignore most of the risks of the mining because the benefits of mining e.g get salary, are worth it.
- D. Worry about risks of the mining
- E. Not interested in risks of the mining

Q24. Sources of information about mining impacts and risks. (Several answers can be selected)

- A. Information provided by the company
- B. People talk about it
- C. Government organization such as the county administration
- D. Mass media
- E. I heard a case at another mine
- F. Other sources
- G. No information about risks

7. Salient value similarity

Q16. What is the most important thing for a long time mining operation? Please list up to three things by importance level to down.

- A. 1.
 2.
 3.
- B. Do not know

9. Demography

Q25. About yourself:

- 1. Name of the place you live:
- 2. Occupation: a. Herder or crop cultivator e. Self employed
 b. Works at a mining company f. Student
 c. Government official g. Pensioner
 d. Works in a company h. Unemployed

Appendix 2. Questionnaire sheet of the survey in Mongolian

Attached letter

Санал асуулга

Хэнтий аймаг, Бор өндөр

Санал асуулганд оролцож байгаа танд баярлалаа.

Энэхүү санал асуулга нь дээд сургуулийн магистрын судалгаа бөгөөд Уул уурхайн төслийн Байгаль орчны үнэлгээ, үүний дотор Нийгмийн нөлөөллийн үнэлгээний дотоод агуулга, цаашдын төлөвлөгөө, хөтөлбөрийг боловсронгуй болгоход чиглэсэн судалгаа юм. Иймээс энэ нутагт үйл ажиллагаа явуулж байгаа уул уурхайн компаний ажилтнуудтай уулзах, нутгийн иргэдийн санал сэтгэгдлийг сонсох зорилготой. Хувь хүний хаяг, нэрийг асуухгүй бөгөөд зөвхөн оршин суугаа газар, хорооны нэрийгбичнэ. Хариултыг бусдад үзүүлэхгүй. Бүх санал асуулгыг нэгтгэж дүгнэлт гаргана.

Дагвадоржийн Лавдмаа

Хоккайдогийн их сургуулийн

Байгаль орчны сургуулийн магистрант

2014 оны 8-р сар

Асуух хуудас

.....аймаг, ... сумд

Уул уурхайн нэг компани, энэ нутагт одоо үйл ажиллагаа явуулж байгаа таны сайн мэдэх компанийг сонгож нэрлэнэ үү.

Компаний нэр :

Энэ компанийг сонгосон шалтгаан :

1. Манай суманд байдаг учир би мэднэ
2. (малчдын хувьд) Манай гэр болон малын бэлчээртэй ойрхон
3. Би /Манай гэр бүлийн гишүүн одоо /урьд энэ компанид нь ажиллаж байсан
4. одоо энэ компанид бүтээгдэхүүн борлуулдаг /борлуулдаг байсан
5. Бусад :

Зөвхөн энэ компаний талаар саналаа хуваалцана уу.

5. Үнэхээр тийм	4. Тийм	3. Дунд зэрэг	2. Үгүй	1. Огт үгүй	0. Мэдэхгүй	
					0.	
1. Уул уурхайн орчин үеийн техник хэрэгслэлээр технологийн дагуу олборлолт, боловсруулалт явуулдаг.	5	4	3	2	1	0
2. Мэргэжлийн өндөр чадвартай боловсон хүчин ажилладаг.	5	4	3	2	1	0
3. Байгаль орчны асуудалд нягт нямбай ханддаг.	5	4	3	2	1	0
4. Нутгийн иргэдэд хамаатай ямар нэг асуудалд нягт нямбай ханддаг.	5	4	3	2	1	0
5. Амлалтаа байнга биелүүлж байдаг.	5	4	3	2	1	0
6. Энэ компанид санал холбоо барихад амархан гэж бодож байна.	5	4	3	2	1	0
7. Урьд нь энэ компанид санал хүсэлт тавьж, холбоо барьж байсан уу?						

-
- А. Тийм б. Үгүй (дараагийн асуултыг алгасна уу)
8. Санал хүсэлт тавихад харилцан ойлголцоход хүндрэл гараагүй, шийдвэрт хүрч чадсан, эсвэл асуултын хариугаа авч чадсан.
- 5 4 3 2 1 0
9. Энэ компаниБайгаль орчны хяналт шинжилгээ хийж бохирдлыг сайн хянаж байдаг.
- 5 4 3 2 1 0
10. Уурхай, үйлдвэрийн орчны байгаль орчны шинжилгээний байдлын талаар иргэдэд тогтмол мэдээлж байдаг.
- 5 4 3 2 1 0
11. Орон нутаг, иргэдтэй холбоотой мэдээлэл ж.нь: танай ойролцоо худаг гаргана гэх мэт мэдээллийг байнга өгч байдаг.
- 5 4 3 2 1 0
12. Иргэд энэ компанийг хүндэлдэг.
- 5 4 3 2 1 0
13. Хэрэв ямар нэг асуудал ж.нь: байгаль орчны бохирдол гарах юм бол шуурхай арга хэмжээ авч бохирдлыг арилгана гэж бодож байна.
- 5 4 3 2 1 0
14. Шударга хандлагатай компани гэж бодож байна.
- 5 4 3 2 1 0
15. Энэ нутагт үйл ажиллагаа явуулж байгаа уул уурхайн үйлдвэрлэлийн талаар сонирхдог уу?
- А. Маш их сонирхдог, энэ талаар мэдээлэл цуглуулдаг
- Б. Зөвхөн өөртөө хамааралтай асуудлыг сонирхдог
- Г. Сонирхдоггүй
16. Урт хугацааны уул уурхайн үйлдвэрлэлд юу хамгийн чухал вэ? Чухал гэсэн дарааллын дагуу 3 зүйл нэрлэнэ үү.
- 1.
- 2.
- 3.
17. Уул уурхайн үйлдвэрлэлд дор дурдах 2 зүйлийн аль нь илүү чухал гэж бодож байна вэ?
- а. Явцын байдал тухайлбал: өндөр мэдлэгтэй мэргэжилтнүүд технологийн дагуу үйл ажиллагаа явуулах*
- б. Эцсийн үр дүн тухайлбал: байгаль орчны нөлөө хамгийн бага түвшинд, иргэдийн арьдралд сөрөг нөлөөгүй байх*
- в. Мэдэхгүй*
18. Энэ нутагт уул уурхайн үйл ажиллагаанаас үүсэх эрсдэл гэж юу вэ?

А. Энэ талаар мэднэ. Хэд хэдэн хариулт байж болно

Хариулт 1.

Энэ талаар: өөрөө мэдээлэл хайж олсон хүний ярианаас сонссон

Бусад

Хариулт 2.

Энэ талаар: өөрөө мэдээлэл хайж олсон хүний ярианаас сонссон

Бусад

Хариулт 3.

Энэ талаар: өөрөө мэдээлэл хайж олсон хүний ярианаас сонссон

Бусад

Б. Эрсдлийн талаар мэдэхгүй

19. Энэ компаний уул уурхайн үйл ажиллагааны байгаль орчны нөлөөллийн талаар та юу гэж бодож байна вэ?

1. Усны эх үүсвэр багасах а. Үгүй

б. Тийм: Та яагаад ингэж бодож байна вэ?

2. Ундны усны бохирдол а. Үгүй

б. Тийм: Та яагаад ингэж бодож байна вэ?

3. Голын усны бохирдол а. Үгүй

б. Тийм: Та яагаад ингэж бодож байна вэ?

4. Малын бэлчээр, хөрсний доройтол а. Үгүй

б. Тийм: Та яагаад ингэж бодож байна вэ?

5. Хөрс химийн бодисоор бохирдох а. Үгүй

б. Тийм: Та яагаад ингэж бодож байна вэ?

6. Агаарын бохирдол а. Үгүй

б. Тийм: Та яагаад ингэж бодож байна вэ?

20. Та энэ компаний талаар юу гэж бодож байна вэ?

21. Уурхай, үйлдвэрийн үйл ажиллагаанаас:

21.1 Хүний эрүүл мэндэд сөрөг нөлөө байхгүй байна. Та санал нийлэх үү?

5 4 3 2 1 0

Хариулт 1 юм уу 2-ыг сонгосон тохиолдолд тодруулбал -----

21.2 Малын эрүүл мэндэд сөрөг нөлөө байхгүй байна. Та санал нийлэх үү?

5 4 3 2 1 0

Хариулт 1 юм уу 2-ыг сонгосон тохиолдолд тодруулбал -----

Энэ компаний эрсдлийн менежментийн талаар та юу гэж бодож байна вэ? (1 хариулт сонгох)

- А. Эрсдлийн менежментийн талаар мэдэхгүй
 - Б. Эрсдлийн менежмент маш сайн, эрсдлээс хамгаалж чадаж байгаа
 - В. Уул уурхайн компаний үр ашиг их ж:нь ийм газар ажиллаж цалин авдаг учир эрсдлийг анхаарч үздэггүй.
 - Г. Уул уурхайн үйл ажиллагааны эрсдлийн талаар санаа зовж байна
 - Д. Эрсдлийн менежментийн талаар огт сонирхдоггүй
22. Уул уурхайн үйл ажиллагааны нөлөө болон эрсдлийн талаар мэдээлэл хаанаас олж авдаг вэ? Хэд хэдэн хариулт байж болно.
- А. Энэ компаниас өгсөн мэдээллээс
 - Б. Нутгийн хүмүүсийн яриа
 - В. Сумын захиргаа гэх зэрэг төрийн байгууллагаас
 - Г. Хэвлэл, мэдээллийн хэрэгслэлээс
 - Д. Өөр газарт болсон явдлаас
 - Е. Бусад эх сурвалжаас
 - Ё. Эрсдлийн талаар мэдээлэл авдаггүй, мэдэхгүй
23. Таны талаар
- 6. Оршин суугаа газрын нэр баг, хороо
 - 7. Эрхэлдэг ажил: а. Малчин, тариаланч д. Хувиараа ажил эрхлэгч
б. Уул уурхайн компаний ажилтан е. оюутан
в. Төрийн албан хаагч ё. Тэтгэвэрт
г. Компаний ажилтан ж. Ажилгүй
3. Боловсрол: А. Дунд сургууль төгссөн Б. Коллеж төгссөн
- В. Дээд сургуулийн бакалавр,
 - Г. Дээд сургуулийн магистр, түүнээс дээш
4. Нас 5. Хүйс
6. Энэ нутагт хэр удаан амьдарч байна вэ?
- А. 5 хүртэл жил Б. 6-10 жил
 - В. 11-30 жил Г. 30-с дээш жил
7. Малчдын хувьд: Ам бүл хэд: насанд хүрсэн

Appendix 3. SPSS analyses outcomes: Regression The G site

The G site

Regression

Correlations

		Trust	Ability	Motivation	Environment
Pearson Correlation	Trust	1.000	0.291	0.608	0.527
	Ability	0.291	1.000	ns	0.281
	Motivation	0.608	ns	1.000	0.473
	Environment	0.527	0.281	0.473	1.000
Sig. (1-tailed)	Trust		0.007	0.000	0.000
	Ability	0.007		0.351	0.009
	Motivation	0.000	0.351		0.000
	Environment	0.000	0.009	0.000	
N	Trust	71	71	71	71
	Ability	71	71	71	71
	Motivation	71	71	71	71
	Environment	71	71	71	71

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Environment, Ability, Motivation ^b		Enter

a. Dependent Variable: Trust

b. All requested variables entered.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	Sig.	t	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.387	0.523		0.462	0.740		
	Ability	0.254	0.117	0.200	0.033	2.171	0.911	1.098
	Motivation	0.477	0.099	0.484	0.000	4.820	0.768	1.302
	Environment	0.234	0.101	0.242	0.024	2.315	0.709	1.411

a. Dependent Variable: Trust

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.693 ^a	0.480	0.457	0.85565

a. Predictors: (Constant), Environmental Protection, Ability, Motivation

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	45.342	3	15.114	20.644	.000 ^b
	Residual	49.053	67	0.732		
	Total	94.394	70			

a. Dependent Variable: Trust

b. Predictors: (Constant), Environmental Protection, Ability, Motivation

Collinearity Diagnostics^a

Model		Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	Ability	Environment
1	1	3.830	1.000	0.00	0.00	0.01
	2	0.089	6.544	0.05	0.18	0.06
	3	0.058	8.128	0.05	0.00	0.91
	4	0.023	12.906	0.89	0.82	0.03

a. Dependent Variable: Trust

End of the dissertation