Marianne Kuisma and Leena Suopajärvi

Social Impacts of Mining in Sodankylä

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Contents

1 Introduction

The aim of the project Regional Innovation in the Nordic Arctic and Scotland with a Special Focus on Regions with Large-Scale Projects (later referred to as REGINA) is to promote the development of sparsely populated areas and their ability to benef t more from large-scale projects based on natural resources. This three-year project started in October 2015 and is implemented concurrently in Finland, Norway, Sweden, Scotland, and Greenland. Funded by the Northern Periphery and Arctic Programme, REGINA covers a number of municipalities, regional development organizations, and research institutes. In Finland, the project is run by the University of Lapland and the Municipality of Sodankylä. The project is led by the Nordic research organization Nordregio.

As part of the REGINA project, the University of Lapland conducted a survey in Sodankylä in the summer of 2016. Its aim was to analyze the local inhabitants' views on mining and their experiences of its impacts on the region. The purpose was to provide knowledge to be used by the municipality as a basis for systematical and sustainable development. There are several ongoing mining projects in various phases in Sodankylä. Owing to the importance of the mining sector and its future potential, the municipality is supplementing its industrial policy with an action plan to meet the challenges of the changing and developing mining business. Another target is a so-called mining agreement between the locals and the local mining actors. The mining agreement is to promote partnership and cooperation between the stakeholders, leading to socially, economically, and environmentally sustainable mining. (Sodankylä Municipal Board 2016)

Social impacts refer to the impacts of a project experienced by individuals, families, or communities. This paper examines mining projects, which may have an impact on a wide variety of life situations and circumstances. The impacts may be manifested as higher rents or property values resulting from an increased demand for housing, as traff c jams in village centers, as lost berry-picking and hunting grounds, as new employment opportunities, or as fear of losing the home region's clean environment. At the municipal level, mining projects often boost

tax revenue and reinforce people's trust in the future, but at the same time the municipal debt and taxation level may increase because of a growing demand for services. Mining projects may also divide opinions and thereby drive people into two opposing camps (see e.g. Vanclay et al. 2015; Suopajärvi & Sairinen 2016).

Social impacts are typically assessed in connection with large environmental projects as part of the environmental impact assessment process (EIA). These social impact assessments (SIAs) that are made beforehand cannot, however, predict the final impacts of mining on everyday life. Therefore, it is important to assess the impacts of a mine throughout its life cycle. According to the research literature, running an SIA process at regular intervals will benefit the mining company, the municipality, and the local residents. Continuous collection of data on the residents' experiences of the impacts of mining and on their attitudes toward mining projects will help companies predict potential changes of opinion and react to people's concerns, to their need for information, and to adverse effects that may threaten a mine's social license to operate, that is, its local acceptance. On the other hand, municipalities may utilize the SIA process for example in assessing the need for housing, in planning their services, or in supporting in-migrating families. For the local residents the SIA process provides a channel to express mining-related ideas, concerns, and improvement ideas (see e.g. Vanclay et al. 2015; Suopajärvi 2015; Suopajärvi & Sairinen 2016).

The REGINA project will develop ways to collect information through which for example the Municipality of Sodankylä can follow the experienced impacts of mining projects even after the projects have ended. The present survey is one of these information channels. Since social impacts have many dimensions, the survey will be revised and re-run during the project. This will lead to usable follow-up information on the impacts of mining projects experienced in Sodankylä.

The next chapter discusses the data and methods used in the project. It is followed by the core results, relating first and foremost to the impacts of mining on the attractiveness, infrastructure, and services of the area. Thereafter, the local residents' attitudes toward mining are discussed on a general level. Area-specific experiences will then be revisited in a chapter on the social license to operate and regulatory control. This chapter focuses on the local acceptance of the ongoing mining projects in the municipality, namely the Pahtavaara mine that may be relaunched in the future, the ongoing Kevitsa mine, and the planned Sakatti mine located on a Natura preservation site. In addition, the local residents' opinions of the success of regulatory control over the projects are discussed. Toward the end of the report, the experienced environmental impacts of the mining projects will be examined. Finally, there is a summary of the salient results of the

work and a few observations that should be addressed in Sodankylä at the moment.

Appended to the report are the basic distribution charts, divided by topic. They are referred to in the text as follows: (e.g. Appendix 1, Figure 2). The citations in the text are from the open-ended answers of the questionnaire. The number in brackets after a citation is the respondent's number. In reporting the results, the exact percentage is given in parentheses, and if the percentages differ, for example between women and men, then both percentages are presented.

2 Research material and methods

The study was conducted in the Municipality of Sodankylä as a survey based on random sampling. The population consisted of local residents, aged 16–76. Altogether 600 questionnaires were sent out in June 2016, of which 300 went to the municipal center, 150 to the mine villages, and 150 to the other villages. Based on the map and postal codes, the following areas were def ned as mine villages: Kelujärvi, Kersilö, Moskuvaara, Petkula, Sattanen and Siurunmaa. The addresses were given and the sample taken by the Population Register Centre. The answering period was 17 June – 31 August 2016, during which time 200 responses were received. Of these, 152 respondents were reached through mail and the remaining 48 through the Webropol system. The low response rate, only 33 percent, is nowadays commonplace in surveys (see e.g. Suopajärvi et al. 2016 and Kokko et al. 2013).

Of the respondents, 46 percent were female (n=92) and 51 percent male (n=102). The remaining 3 percent (n=6) did not announce their gender. Almost half of the respondents had secondary school education, 15 percent had a university of applied sciences degree, and 12 had a university degree. Ten percent of the respondents were entrepreneurs, 20 percent were professionals, more than 20 percent were employees, and almost 30 percent were pensioners.

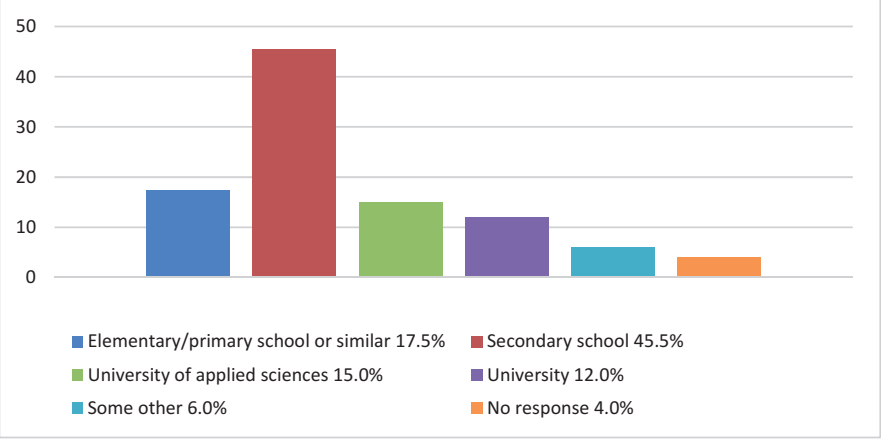


Figure 1. Education (%)

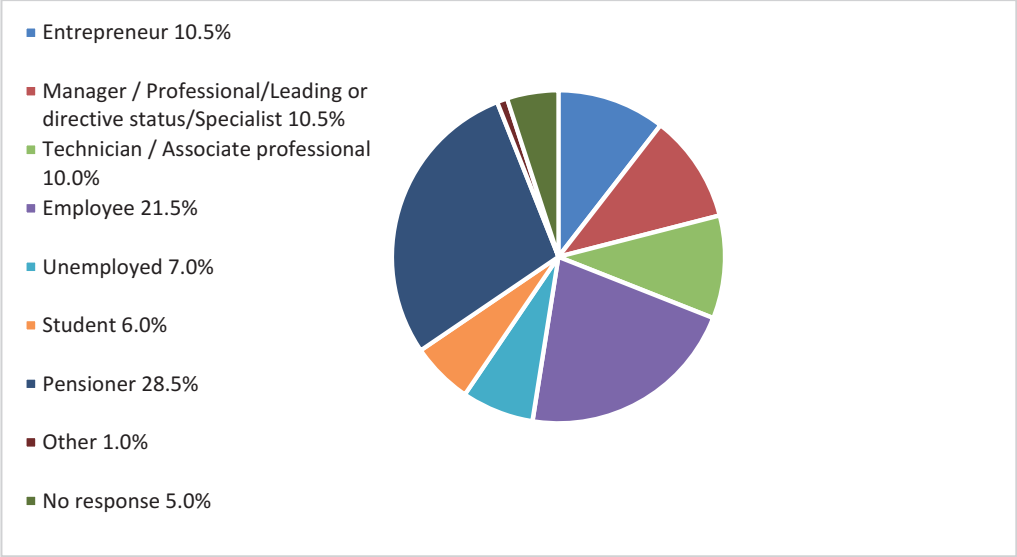


Figure 2. Life situation (%)

Except for the small share of unemployed people, the material matched the population structure of the municipality rather well. Seven percent of the respondents were unemployed, although according to Statistics Finland (2016), the municipality's unemployment rate was 14.1 percent in 2014. Entrepreneurs, on the other hand, were slightly overrepresented. Ten percent were entrepreneurs, although the municipal statistics say that in 2014 their share was 6.1 percent (Sodankylä 2014). Six percent did not reveal their life situation. This group may have included unemployed people as well as people representing other demographic groups.

Approximately 53 percent (n=105) of the respondents lived in the municipal center of Sodankylä. Roughly 23 percent lived in the mine villages, 21 percent in the other villages, and 4 percent did not announce their place of residence.

To ensure the validity of a survey, it is essential to plan the questionnaire and the data collection method carefully and to def ne the population clearly. Validity is further ensured by a representative sample and a high response rate (Heikkilä 2002). The present survey was planned by studying earlier SIA surveys of natural resource projects as well as surveys focusing on the attractiveness of a region, its appeal, and the well-being of the local residents. The survey was reviewed twice with the project's local steering group members and the municipal leaders, and new drafts were made on the basis of the feedback before f nalizing the questionnaire. The sample can be considered representative of the residents of the municipality regardless of the above-mentioned small deviations and relatively low

response rate. It should be noted, however, that a sample can never fully represent the residents or their opinions and that the results can only be interpreted in terms of probabilities.

Starting from the planning of the survey, special attention was paid to the anonymity of the respondents throughout the research project. The replies and the respondents' contact information were never handled together. Consequently, the researchers were unaware of the respondents' identity. From the questionnaires, the replies were entered into the SPSS program for statistical analysis.

3 Experienced impacts of mining on the attractiveness, infrastructure, and services of Sodankylä

First, the survey charted the residents' experiences of the attractiveness, infrastructure, and services of the municipality in general. Thereafter, the impacts of mining were brought in. The respondents were mostly satisf ed with the Municipality of Sodankylä as a place to live, as indicated by Figure 3. The atmosphere was considered active, the area nice to live in, and the environment tidy and clean. Sodankylä was also considered a safe place, which is of great value in global terms. There was practically no variation in the replies in terms of gender or place of residence. Men and women thought very much alike. Women were more socially networked than men, but men considered Sodankylä as a better place to live than women. The residents' general view of the municipality was very positive in the municipal center as well as in the mine villages and the other villages. The greatest divergence of opinion was related to decision makers' sense of responsibility in securing the interests of the residents. Almost 40 percent (39.3%) were satisf ed with the decision makers, one-third (33.2%) were dissatisf ed with them, and close to 30 percent (27.6%) neither agreed nor disagreed with the statement.

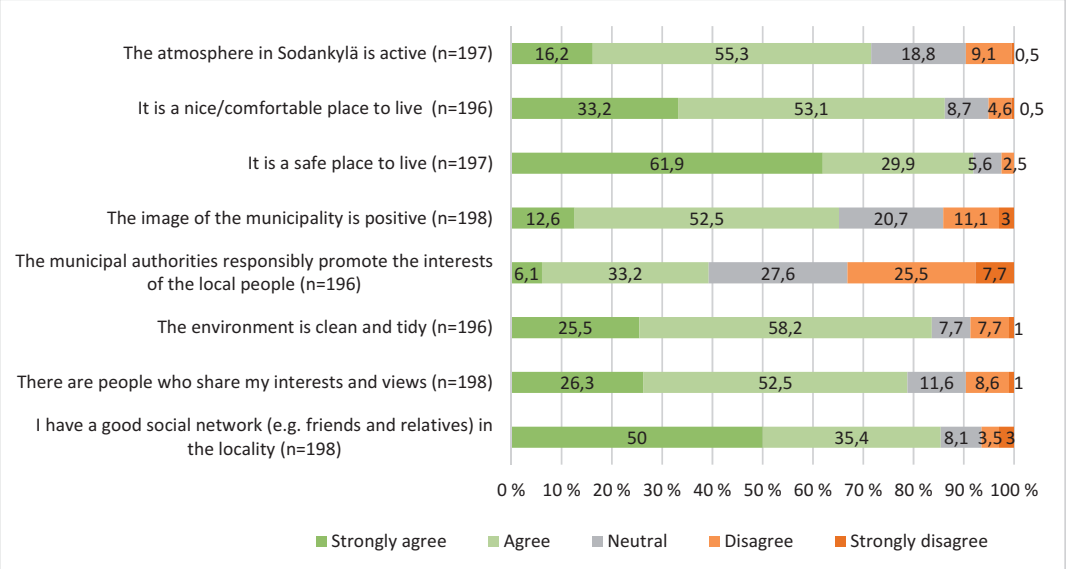


Figure 3. Attractiveness of Sodankylä as a place to live (n=196-198)

Based on the survey, mining has had positive effects on Sodankylä's atmosphere and attractiveness (Figure 4). It has also improved the image of the area and brought new social networking possibilities. The negative effects relate for example to safety: almost 30 percent of the inhabitants of the municipal center and 40 percent of the people living in the mine villages saw that mining had decreased safety in the area. This is most likely associated with decreased traff c safety and with concerns over the mining industry's sensitivity to economic changes, as will be seen further down (Figures 10 and 6). In general, however, the residents considered Sodankylä a very safe place to live.

Roughly 50 percent of the respondents saw that mining has harmed the environment, while in the mine villages the corresponding f gure was 60 percent. The conf ict between economic growth and environmental concerns has also appeared in earlier studies on Sodankylä. Stella Selinheimo (2014, 79) notes that "mining was considered rather acceptable in Sodankylä because of its positive effect on employment. However, the integrity of Lapland's nature and the related values were considered important, and therefore the acceptance was not shared by everyone." A third (33.5%) saw that the decision makers should pay more attention to the residents' opinions in mining-related issues. The most critical opinions were given by the residents and land-owners of the mine villages (Figure 4).

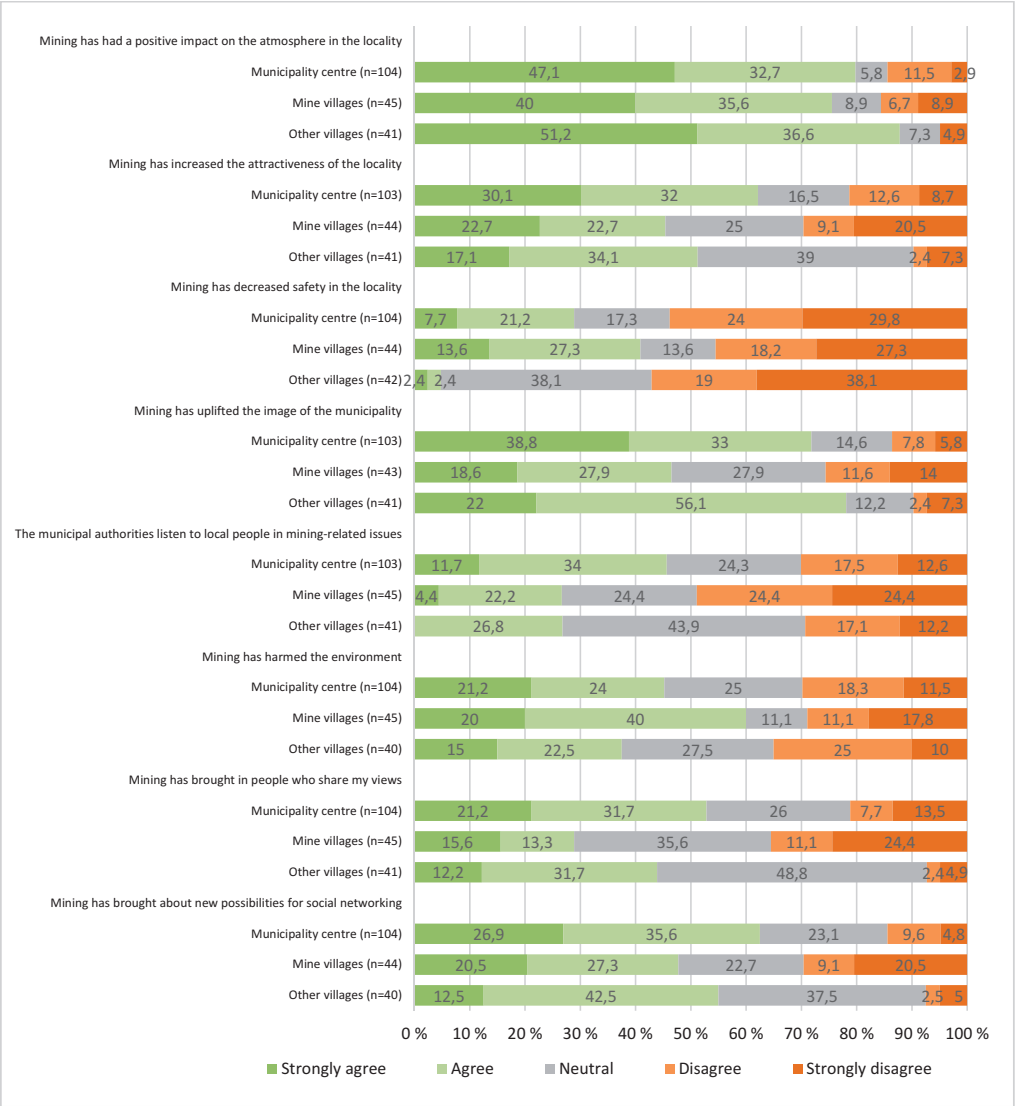


Figure 4. Effects of mining on the attractiveness of the area, divided by village (n=40–104)

The respondents were also asked to assess Sodankylä's public and private services, infrastructure, free time and career opportunities, cost of Pliving, supply of apartments and houses, and outdoor recreation options, as well as the impacts of mining on these issues (Appendix 1, Figures 2 and 4). The answers show that the possibilities of outdoor recreation (95%) and free time activities (90%) were clearly appreciated by the residents. At the other end, people were dissatisf ed with the cost of living; the supply of housing; educational, employment and career opportunities; and the condition of the streets and roads. Figure 5 shows that almost 60 percent of women were dissatisf ed with the supply of educational, employment

and career opportunities, whereas a slight majority of men were satisf ed with them.

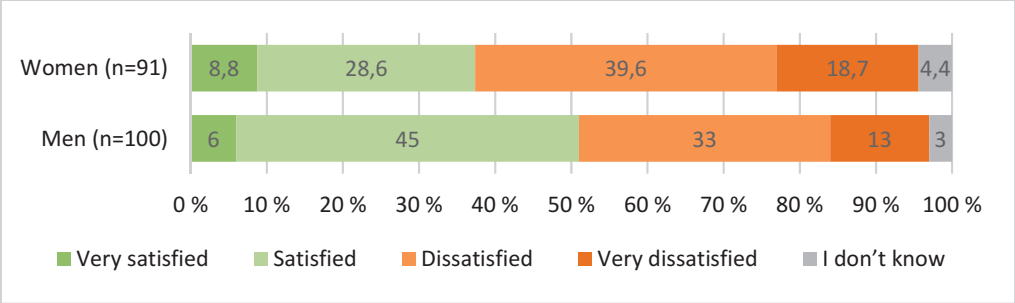


Figure 5. Opinions on education, work, and career opportunities by gender (n=91–100)

Regarding the future, it is important to discuss how the municipality and possibly also the mining companies could advance women's education and career opportunities. According to Ulla Syrjälä (2016), approximately 25 percent of the Boliden Kevitsa mine workers are women. The mine has thus opened up new work opportunities for women. On the other hand, jobs are needed in other lines of business as well. The employment situation in other branches may make it impossible for families to move to Sodankylä or to acquire a second home in the area (Viinamäki 2015). Since women's employment cannot be based mostly on care work and mining, municipal actors should think about ways to encourage women for example toward entrepreneurship and expert positions.

The well-being of young women is essential for the vitality of the region. The REGINA project has previously made a survey on the well-being of mothers who have moved into Sodankylä. Their wellbeing was associated with issues that are rather simple as such but make a difference in everyday life: (1) becoming a member of the community, (2) getting support in daily life and problem situations, and (3) having attractive surroundings in terms of services, activities and infrastructure. The interviewed mothers considered Sodankylä a good and safe place to live and to raise a family. They appreciated clean nature and close-by services in a small community. The close-knit community also anchored in-migrating families to the municipality: they wanted to stay and raise their children there – as long as they had been accepted into the community (Kuisma 2016).

The respondents, both women and men, were dissatisf ed with their educational, employment and career opportunities. On the other hand, they thought that mining had a positive impact on these issues (women 83.3% and men 79.2%). One person described it by saying, "The mine

has sustained our family and hopefully continues to do so in the future" (40). The respondents also thought that their opportunities had improved especially in terms of mining education. Further, the positive effects were connected to the provision of services (women 70.5% and men 76.3%), and mining was considered as a booster of activity in Sodankylä and among its businesses and as an investment in the future. Several respondents said that mining had indirectly given them employment in trade, construction, or daycare. The employment factor was repeated many times in the open-ended answers: together with services it was considered to enable local youths and older workforce to stay in the region and not seek for employment elsewhere. It had also made it possible for people to return to their home region.

The most negative opinions concerned the impacts of mining on the price of housing and on outdoor recreation possibilities in the mine villages. The supply of lots and housing also divided opinions. Nearly two-thirds (64.8%) of the respondents thought that mining had increased housing costs. Opinions were very much alike regardless of gender or place of residence. The greatest effects hit the municipal center, but prices got higher in outer villages as well. The housing situation was mostly seen as a negative issue. Only those who had sold or were about to sell their house saw it as a positive issue, bringing them nice prof ts thanks to the "mining bubble", as it was called in some of the open-ended answers. Increased housing prices and a lack of suitable lots and apartments may also have a negative effect on in-migration and encourage people to commute longer distances between home and work. The MineHealth project carried out earlier in Sodankylä produced similar results, suggesting that the possibility to own a house or apartment leads to a stronger commitment to settle in the mining region (Viinamäki 2015, 16).

One-third (33.4%) of the respondents living in the mine villages thought that their outdoor recreation options had decreased. In the other villages the effects of mining were smaller in this respect. Based on the survey, mining's impact on events and the supply of cultural activity was the smallest (no positive and no negative effect). Nearly half of the respondents (44.5%) had noticed no impacts on culture, women less often than men, and in all of the villages people had noticed fewer impacts on culture than in the municipal center.

4 General attitudes toward mining

Most of the residents of Sodankylä were interested in mining and things associated with it (76% of the respondents, slightly more men than women) and the activity was mainly considered acceptable (by 76%). Half of the respondents (53.9%) considered the benef ts more signif cant than local adverse effects, but people were worried about the sensitivity of the business to economic f uctuations (80.2%). Half of the respondents (49.8%) thought that economic growth should not outweigh environmental damage, while more than 40 percent were also ready to lower their own standard of living to protect the environment. However, one respondent (147) said that making environmentally friendly choices does not necessarily lead to a lower standard of living. Mining was considered prerequisite to maintaining the current standard of living (60.2%), but people also appreciated the clean environment and expressed a will to preserve it. Nearly 70 percent believed in the development of science and technology and their ability to solve problems related to sustainable mining. Mining and sustainable development were not considered mutually exclusive (72.9%). Women were more critical than men, placing the environment ahead of economic interests. Men's replies were more dispersed. Men also counted more on scientif c and economic development and were more willing to sacrif ce the clean environment. Similar gender-based differences in environmental thinking have also been observed in earlier studies (e.g. Suopajärvi et al. 2016).

Most of the respondents (80.5%) supported a special mining tax and thought that mining companies should f nance municipalities' public expenditure, for example by covering some of the costs of the infrastructure (85.2%). The respondents counted on Finnish mining expertise, and roughly 60 percent wished that the mining companies operating in the country would also be owned by Finns: "Finland should carefully consider establishing a state-owned mining company. Multinational companies will soon have educated a new generation of Finnish mining workers" (64). The majority (82.1%) also thought that mining can be practiced more responsibly in Finland than in less developed countries. In the open-ended questions the respondents contemplated thoroughly on the responsibilities related to mining and consumption. Respondent no. 167 stated, "It is

easy for us in Finland to outsource the impacts of our consumption and standard of living. We should be able to discern the ENTIRE footprint of our lifestyle, globally. If the whole footprint would be in Finland, would we accept it? I bet we wouldn't. Why, then, do we accept outsourcing the impacts to other countries? . . . As one of the world's richest and most consumerist societies, we should take more responsibility for the impacts. Therefore, it would be contradictory to ban mining in Finland." More than half of the respondents (56.9%) would also support the European Union's self-suff ciency in minerals production: "Mining must be augmented. Mining products are mostly consumed in Western countries, and it is morally justif ed to extract raw materials as far as possible where they are consumed" (191).

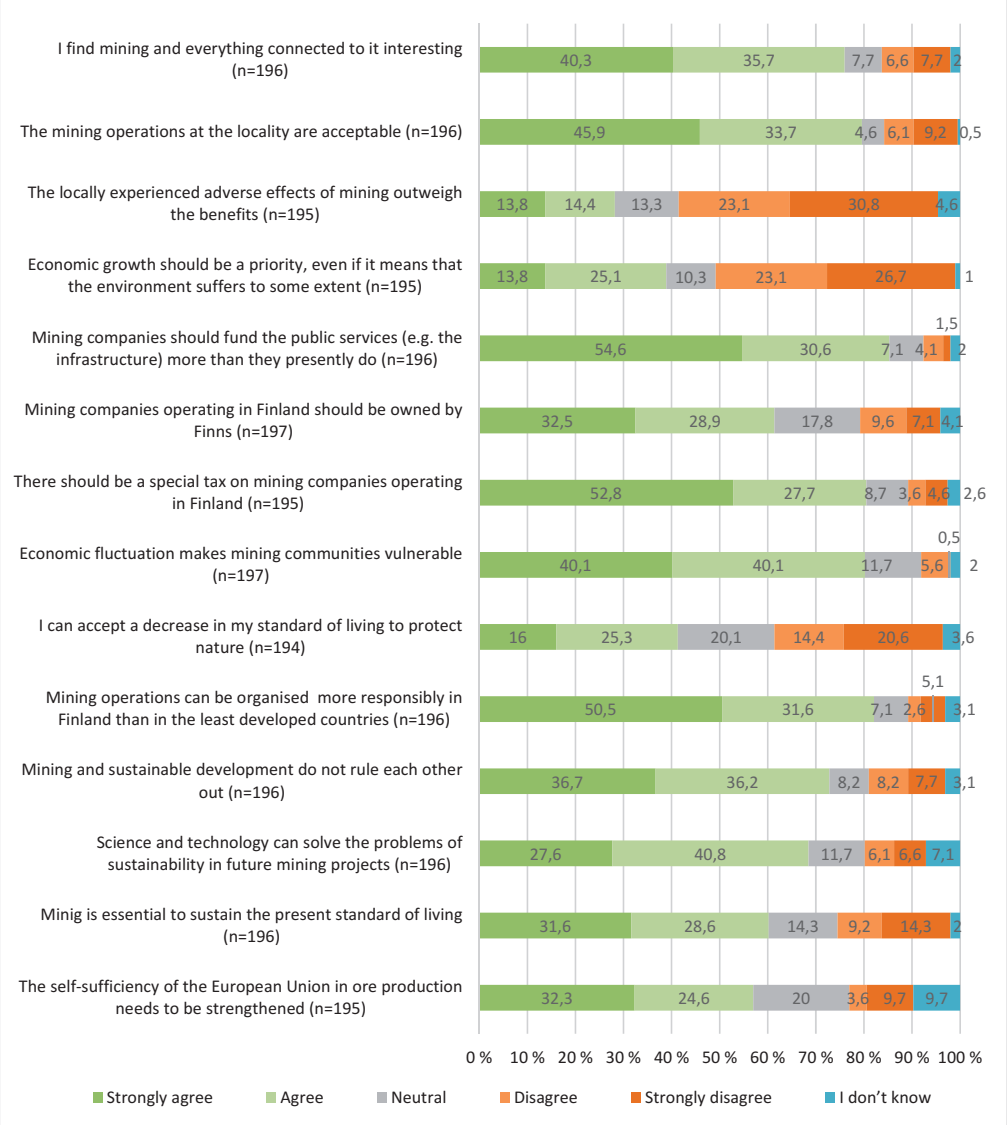


Figure 6. Attitudes toward mining (n=194–197)

More than 90 percent of the respondents had noticed that the mining industry has managed to employ local residents. As Figure 7 shows, mining is in fact considered important for the vitality of the municipality (79.8%). It has had a positive effect on the number of inhabitants (74.2%) and contributed to the local economy. There is skilled workforce in the locality for the needs of the mining industry, but the sector's fast development was brought up: Approximately 30 percent thought that there are not enough skilled workers in the area to meet the future demand of the industry.

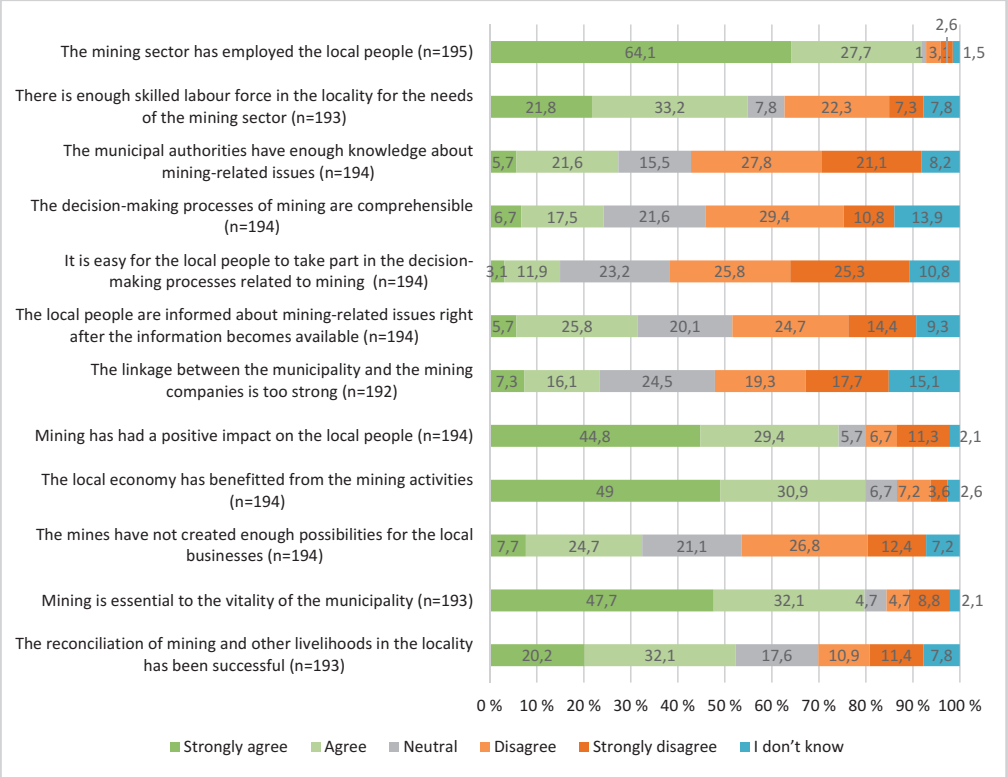


Figure 7. Decision making and socio-economic impacts (n=192-195)

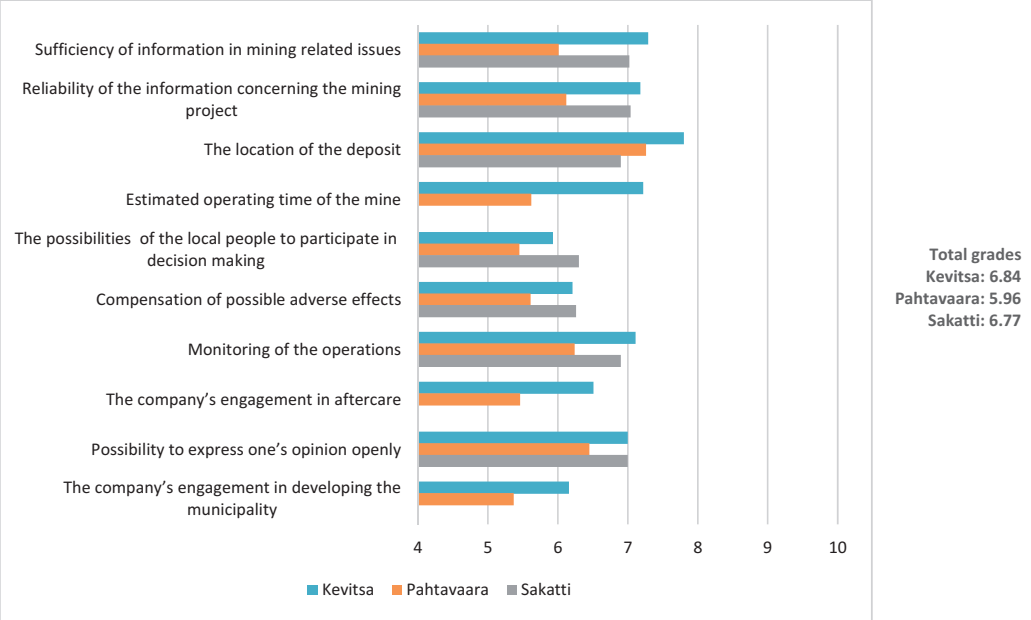
Almost half of the respondents (48.9%) thought that the municipal authorities did not have enough knowledge and expertise in issues related to mining. The decision-making processes in the mining projects were considered unclear (40.2%), and it had been diff cult for the local residents to participate in them (51.1%). Nearly 40 percent of the respondents felt that they had not been informed about issues f rst-hand. One-fourth (23.4%) thought that the authorities and the companies were too closely connected. The strongest criticism of the authorities and the decision-making processes came from the mine villages. Almost 65 percent of

the mine villagers had found it diff cult to participate in the processes. However, they appreciated the industry's positive effect on employment, and, in line with the other villagers, considered it important for the vitality of the municipality. It would be advisable to discuss ways in which the municipality and mining companies could better answer the local resident's questions, involve them in decision making, and provide them up-to-date information about ongoing mining projects. According to respondent no. 179, not enough information had been provided: "It would be nice to hear what the companies are doing here. Right now there's not enough info around, they keep quiet, and they only speak when they have to."

5 Social license to operate and regulatory control

The social license to operate, that is, getting the local residents' approval for mining activities, is a debated issue in the mining industry. Acquiring the license requires the company to exceed its statutory responsibilities, and it is measured by trust earned through everyday practices. The absence of the license may result in conf icts, negative publicity, and a bad reputation – even the withdrawal of f nanciers. According to research, getting a social license to operate requires open, active, and honest communication, participation channels for citizens, and the company's commitment to local development (e.g. Jartti et al. 2014; Kokko et al. 2013; Selinheimo 2014; Vanclay et al. 2015).

The survey focused on the Kevitsa and Pahtavaara mines, as well as the Sakatti project that is still under study. Owing to changes in ownership, the respondents were asked to assess the projects, not the operation of individual companies. Since the Sakatti mine is still under study, it was not possible to assess the operating period of the mine, the company's commitment to aftercare, or the company's commitment to local development. The grading scale 4–10, familiar from Finnish schools, was used in the assessments. Follow-up information on the social license to operate will be produced by repeating the survey later during the REGINA project.



Grading scale of the assessment: 10 outstanding, 9 very good, 8 good, 7 satisfactory, 6 fair, 5 adequate, 4 weak (n=132–167).

Figure 8. Social license to operate of the Kevitsa mine, the Pahtavaara mine, and the Sakatti project that is still under study.

The Kevitsa mine and the Sakatti project were both assigned a total grade of almost seven, that is, almost satisfactory. The Pahtavaara mine was assessed as fair (6). The locations of Kevitsa and Pahtavaara were good (8) and satisfactory (7), respectively. Sakatti's location on a Natura preservation site was considered problematic and stirred up emotions in the open-ended answers. It was commented on as follows: "There is no lawful way to launch a mine in Sakatti. The activities of the company and the authorities are substandard at best. Jobs must not be created at all cost. Sakatti is a threat to the integrity of the entire Natura network" (2). However, there were also those who welcomed the Sakatti mine.

As for the suff ciency and credibility of communication, Kevitsa's grade was 7, Sakatti's also 7, and Pahtavaara's 6. Sakatti was commended for arranging information sessions. Regarding the Kevitsa mine, people felt that the changes brought on by the Boliden deal in 2016 were not discussed enough. People wanted to know how the change of ownership will affect the locality and employment, and whether environmental changes had already occurred. The companies in Pahtavaara were clearly considered the poorest performers in communication.

In terms of local residents' chance to participate in project-related decision making, Sakatti was rated satisfactory (6), Kevitsa slightly below it, and Pahtavaara adequate (5). "The grades are poor because I don't feel that the municipality or the residents have had any real possibility of inf uencing the companies' activities and our requests have not led to concrete action" (179). Respondent no. 178 felt that there is no genuine way to inf uence the companies because they are listed: ". . . and for example Kevitsa doubled its production while reducing its operating period by half, and no one could do anything about it." Regarding the Kevitsa and Sakatti projects, the chance to openly express one's opinion was rated satisfactory (7), while the corresponding grade assigned to Pahtavaara was 6.5. Respondent no. 24 refers to the local division of opinion by saying that having a positive attitude toward mining "was like stirring up a hornet's nest." Therefore, the respondent did not have the courage to talk about the issue. Another respondent (52) found it possible to comment on mining objectively because the person had migrated into the region.

Regarding operating periods, only the Kevitsa and Pahtavaara mines were assessed in the survey. The operating period of Kevitsa was rated satisfactory (grade above seven), whereas Pahtavaara was rated adequate. Respondent no. 172 said, "The difference between a large and a small company is great in terms of continuity, reliability, and operation. Pahtavaara is not a lasting project because they always seem to run out of cash." Operational control in all three projects was graded from 6 to 7. Compensating for potential adverse effects was graded from 5 to 6, Pahtavaara getting the lowest grade. An existing mine was expected to bring benef ts, money, and work for as long as possible without spoiling the environment. The respondents expected the mining companies to have enough money after closure to remove and clean the waste that is left behind.

The open-ended answers did not contain any suggestions regarding the companies' commitment to local development. The reasons for this should be discussed because according to the previous study, "the acceptability of mining companies could be increased by their stronger commitment to municipal development, for example to the construction of housing, either voluntarily or by way of a mining tax" (Selinheimo 2014, 79).

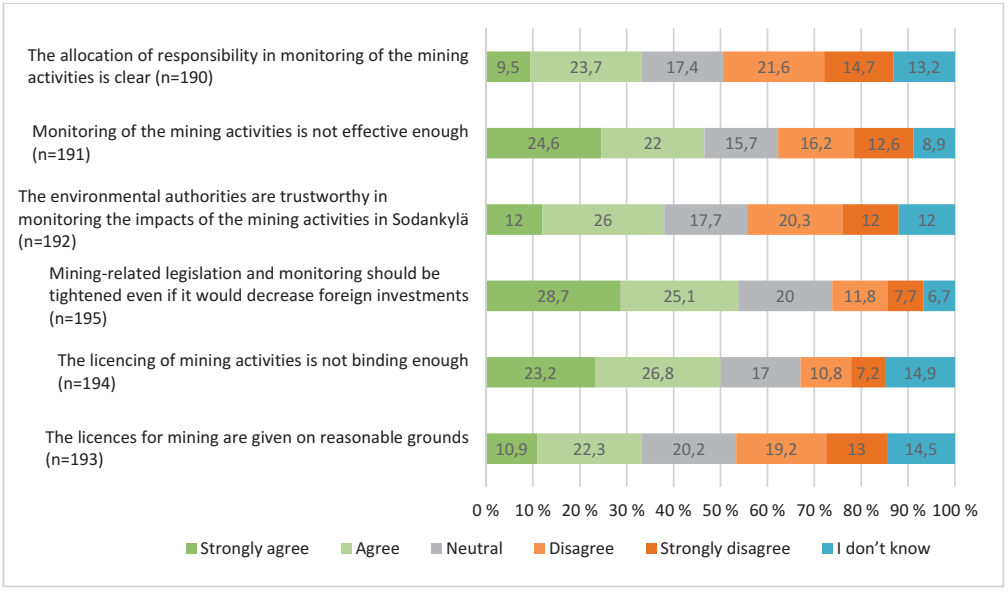


Figure 9. Monitoring of mining (n=190-195)

The social license to operate (SLO) refers to a company's operation in a local community, but the implementation of mining projects is also greatly dependent on the authorities. This is why the respondents were asked to assess the regulation and control of mining. Figure 9 suggests that nearly half (46.6%) of the respondents were critical about the eff ciency of monitoring or the validity of environmental permits (50%) and more than half (53.8%) thought that the regulation of mining should be tightened even if it decreased foreign investment. Opinions were divided in terms of regulatory control as well. Nearly 40 percent believed that the environmental impacts of mining were under control in Sodankylä, one-third (32.3%) were distrustful, and nearly one-f fth (17.7%) had no clear opinion on the matter. Distrust was increased by the catastrophic events around the Talvivaara mine, which people wish to avoid in Sodankylä: "I'm feeling confused after the events in Talvivaara. I want to believe that the authorities can do their job, but at times I'm struck by disbelief" (45). Further, the allocation of monitoring responsibilities was not considered clear, and opinions were divided as to whether environmental permits are granted on justif ed grounds.

The assessments became more critical toward the end of the survey, especially when the respondents began to ponder the operations of the individual mining projects in the locality (Figure 8). The number of those who neither agreed nor disagreed or did not know also grew toward the end. The survey appears to have encouraged the residents to consider and assess the social and environmental impacts of mining in more concrete terms than before.

6 Environmental impacts

Every mining project has environmental impacts, both direct and indirect ones. They may concern people's health, living conditions, and well-being, or the natural environment including soil, water, vegetation, and living organisms. The constructed environment, for example roads, buildings, and landscapes, may also be impacted. When a mining project enters a locality, the residents are confronted with a value conf ict between positive employment and development prospects and negative environmental impacts and risks. Environmental impacts cause concern especially among people who live close to a mine and whose everyday life is affected the most (Mononen 2016, 187).

Mining stirred up emotions particularly in regard to environmental impact assessment. Some respondents considered the mine as a gloomy, troubling, and dismal source of pollution that threatens traditional livelihoods: "It's sad to see the minerals being quickly dug out of the ground. I'm disappointed of the way money talks in mining. Nature-based livelihoods and values mean nothing in mining" (184). Others saw mining as a necessary evil that creates conf icting emotions: "Although my thoughts about mining are mostly negative, it is not rational to oppose the business as a whole because we all use and need metals. I'm for reduced consumption and increased recycling of metals. Under no circumstances will I accept mining plans, not even prospecting, in protected areas" (180). Some respondents were very optimistic about mining and considered it mainly as a creator of jobs for local residents. They wished, however, that environmental issues would be handled safely and that the life cycle would be long enough – not an "instant-production-and-fast-retreat" process (67).

According to the respondents, the most adverse environmental impacts of mining fall upon traff c safety, waterways, living organisms, and landscapes. Smells and lighting were considered the least harmful effects. Women were a bit more critical than men, but the differences were not great. The greatest adverse effects were experienced by residents in the mine villages and by landowners in the mining areas. In terms of traff c safety, almost all (93%) of those living close to a mine had experienced some

adverse effects (Figure 11). The mine villagers reported adverse impacts (from minor to major) on f shing and/or hunting (75.5%), and almost to the same degree on waterways (71.1%) and living organisms (68.2%).

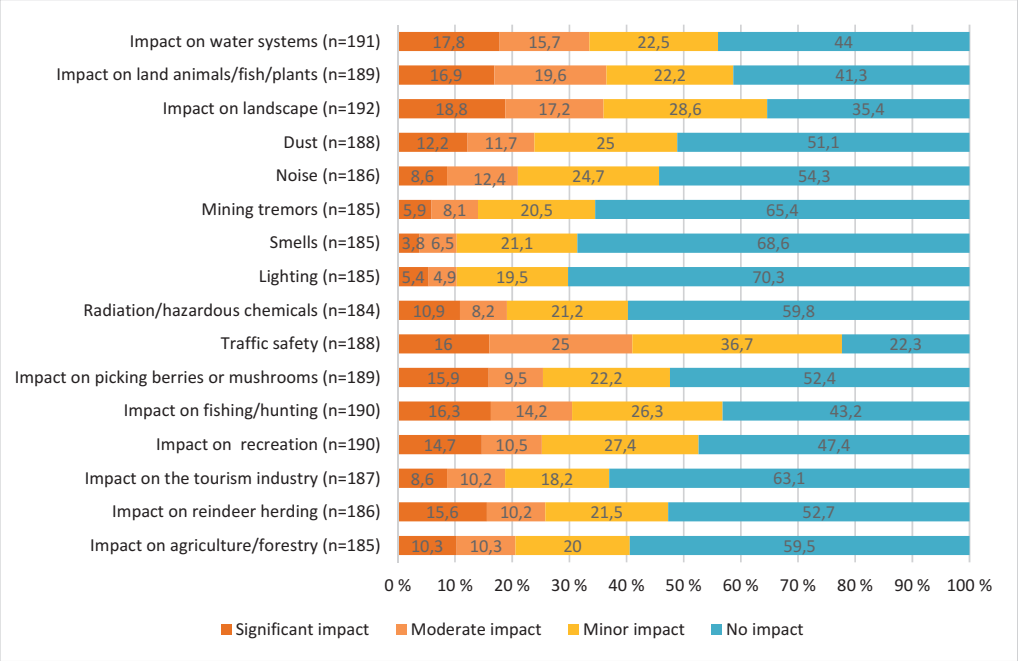


Figure 10. Environmental impacts of the mining projects (n=184-192)

Almost half (48.9%) of the respondents had experienced problems with dust. Some said that dust passing through the environment had diminished their berry picking options, while others contemplated on dust exposure resulting from mining and its potential health hazards. The MineHealth project (2015) examined the Kevitsa mine workers' exposure to dust, tremors, and cold air, among other things. Dust problems arise from extracting, drilling, crushing, loading, and transporting ore and waste rock. Mine workers are exposed to mineral dust, containing for example quartz and asbestos, and to particulates that may cause serious damage to the lungs. Mining almost always causes dust problems, but with suff cient measures, work arrangements, and protection the problems can be reduced (MineHealth 2015; Keskimaunu & Pohjanen 2014).

The respondents did not consider mining as a signif cant threat to tourism, agriculture, or forestry. In their view tourism is an important business, but it is carried out far enough away from mines (157). The impacts on reindeer herding were mostly restricted to the mine villages, where 25 percent of the respondents had experienced signif cant and more than half some adverse effects (54.6%).Pollution and spoiled grazing

grounds were seen as threats. “If the environment gets polluted, so will the reindeer, and I will lose my livelihood, our whole way of life. My fear is that if you can set up a mine on a Natura site, it will lose its meaning and no longer provide any protection. After that, you can enter other sites, as well. Natura, however, has been considered as the guiding principle. Protected areas are important for nature and reindeer herding” (177). Mining may have a damaging impact especially on reindeer herding, which is an important traditional livelihood in northern Finland. It also carries a signif cant cultural meaning. Reindeer herding is part of reindeer owners’ identity and lays the foundation for a lifestyle that adjusts itself to the rhythm of nature and the seasons. It is characterized by a strong sense of community and it is passed on from one generation to the next. Further, since reindeer herding is connected to other lines of business, such as tourism and agriculture, the cumulative effects of increased mining activities may also extend to them. The social impacts of large natural resource projects may affect the age structure of reindeer herders, as young people are leaving the branch. They may also escalate local disputes caused by decreased social cohesion and increased inequality (affecting individual herding cooperatives and reindeer owners). In addition, they may have an effect on reindeer herders’ health and safety at work. Increased mining activities upset reindeer herders and creates uncertainty about the future and prof tability of the branch. On the other hand, not all of the impacts are negative. Mining may also have positive impacts by bringing new jobs and extra income to reindeer herding communities (Reindeer Herders’ Association 2014.)

When assessing the environmental and social impacts of mining, it should be noted that mines may also increase inequality based on a person’s place of residence. Respondent no. 32 said, “The adverse effects come really close, 0–15 km from here. The benef ts go to those living further away. The impacts could be prevented and compensated for, but nobody cares because the decision makers live somewhere else. People living in the vicinity are sacrif ced so that others can make prof ts.” Experienced social justice is an essential part of social sustainability, which requires supporting people’s life management, their possibilities of making a living, and their identity. To be socially and culturally sustainable, a natural resource project should promote local residents’ inf uencing possibilities, their employment, continuity of their livelihoods, their recreational opportunities, continuity of local culture, and preservation of the landscape and cultural sites (Hast & Jokinen 2016). Mines reshape communities as well as their environment and familiar landscapes. They also prevent the recreational use of land areas. Up to 75 percent the mine villagers felt that the mine had ruined the landscape and more than 60 percent had experienced adverse effects on the recreational use of the environment. Based on this, the authorities

of the municipality should consider the people living close to the mines in terms of how to address their experiences of inequality amidst the changing landscapes and environment. They should also think about potential compensations that would prevent the division of residents into those who benef t and those who suffer.

The respondents were genuinely worried about the environment both in the villages and in the municipal center. Besides reindeer herding, also berry picking, hunting, and f shing are dependent on clean nature. Even so, the respondents considered the green movement and defending of environmental values ”an obstruction to development” (61).

Regional development should not be examined one-sidedly, either, by planning a future that is based on one business only. Sustainable economy and mining industry also require an environmental awareness: “Respecting both people and the environment is a principle that mining companies must follow if they wish to advance the acceptability of their operations” (Mononen 2006).

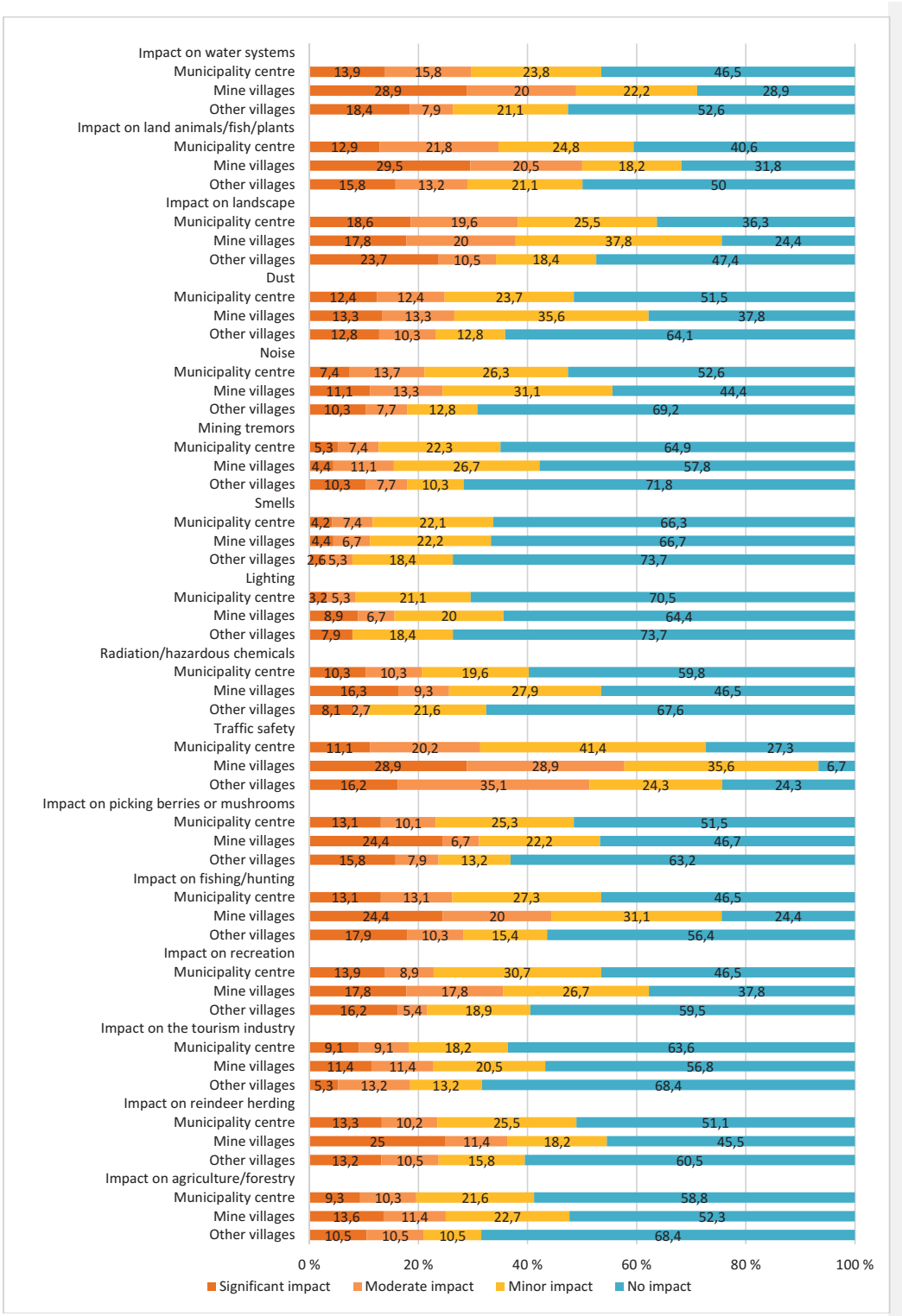


Figure 11. Environmental impacts according to place of residence (n=37–102)

7 Conclusion

People are satisf ed with Sodankylä as a place to live, and mining is in general considered to have a positive effect on the vitality and spirit of the municipality. Based on the survey, mining has had positive impacts on Sodankylä's atmosphere and attractiveness. It has also improved the image of the area and brought new social networking possibilities.

There is, however, a conf ict between economic benef ts and environmental hazards. Roughly 50 percent of the respondents saw that mining has harmed the environment, while in the mine villages the corresponding f gure was 60 percent. Mining projects generate both direct and indirect environmental impacts. The respondents were worried about the cumulative environmental impacts of mining – keeping in mind the environmental problems of the Talvivaara mine. In terms of the social license to operate, predicting environmental impacts and reducing adverse effects are the f rst and foremost issues to be solved. Managing environmental impacts involves not only the mining companies and the municipality, but also regulatory control, in which the municipality may strive to take an active role.

Even within the municipality, the impacts of mining affect different groups in different ways. The adverse effects are experienced by those living close to a mine. A mutual feeling of justice and equality among the residents of the municipality is an important issue for which the decision makers must take responsibility together.

Of the various livelihoods, mining may harm reindeer herding in particular. The expansion of the mining sites may lead to losing the livelihood and, on a larger scale, harm the image of reindeer products and thereby reindeer husbandry as a whole. The impacts on tourism were considered to be minor because Sodankylä's existing mines and planned projects are not currently located in tourism areas or their close vicinity.

More education, work, and career opportunities are needed for women in Sodankylä. As for women who have moved into the area, it is important that they can become part of the community, have access to family services, and get support from the community.

Improving road safety turned out to be the most urgent and concrete development need. Another need to be met is the demand for housing.

If mining is to continue – even expand – in Sodankylä, then the participation of the residents and the inf uencing possibilities of different demographic groups play an important part in getting the social license to operate. The municipality's proposal to draw up a mining program and the attempt to make a joint mining agreement are tools for promoting sustainable mining.

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Appendix 1. Distribution by topic

Experienced impacts of mining on the attractiveness, infrastructure, and services of Sodankylä

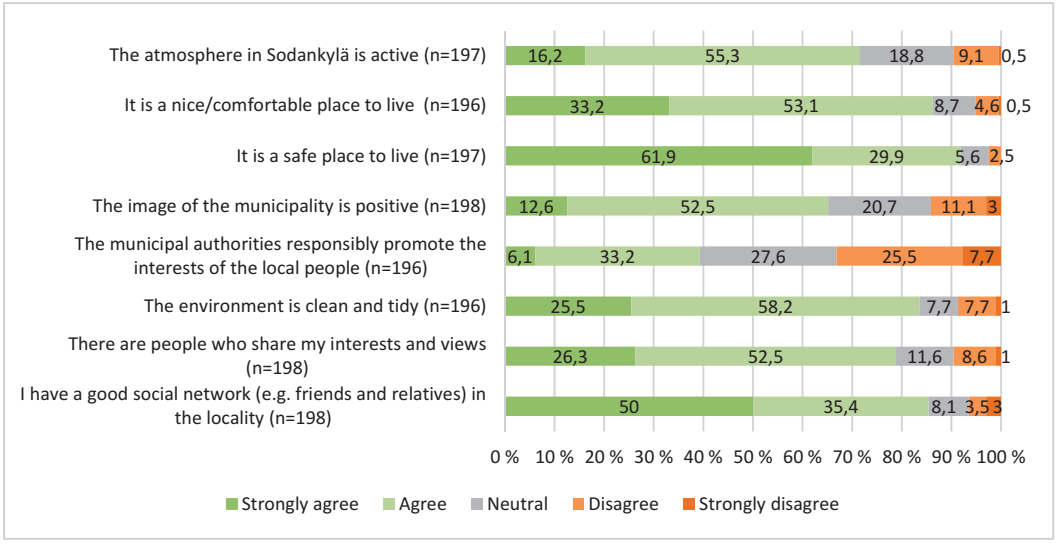


Figure 1. To what extent do the following statements match your opinion about Sodankylä? (n=196–198).

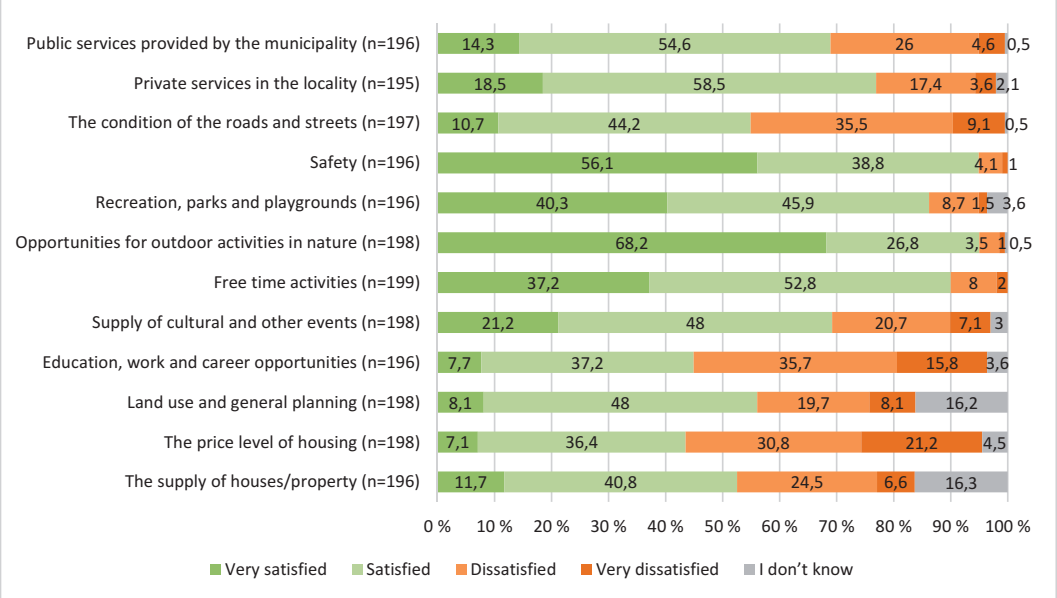


Figure 2. How satisf ed are you with the following issues in Sodankylä municipality? (n=195–199).

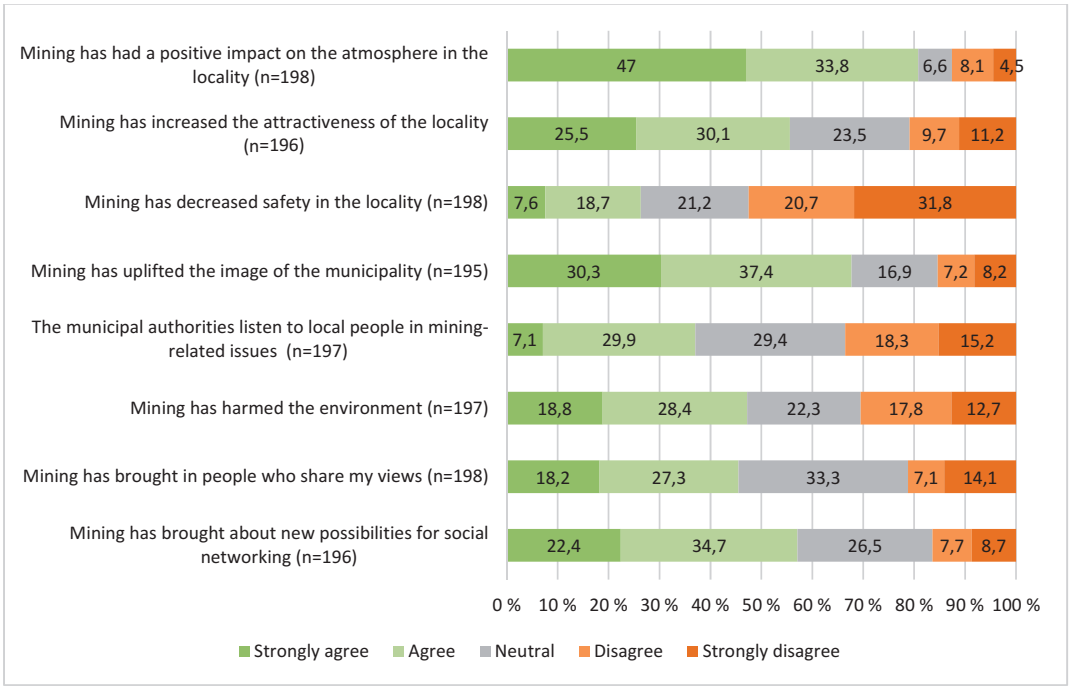


Figure 3. To what extent do the following statements match your opinion? (n=195–198).

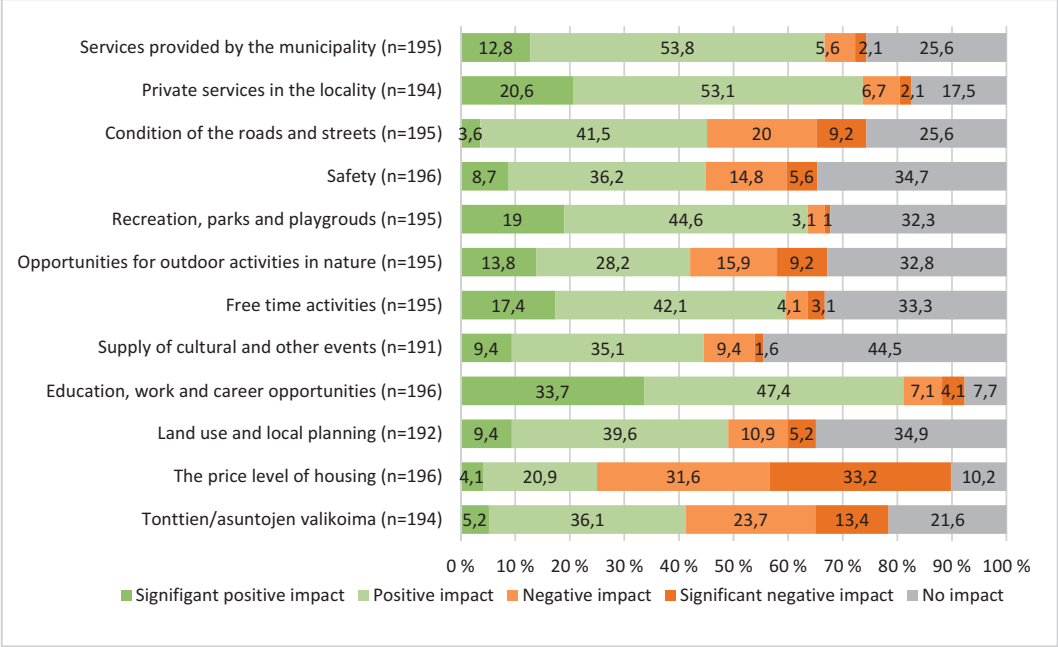


Figure 4. How strongly has mining affected the following issues in Sodankylä municipality? (n=191–196).

General attitudes toward mining

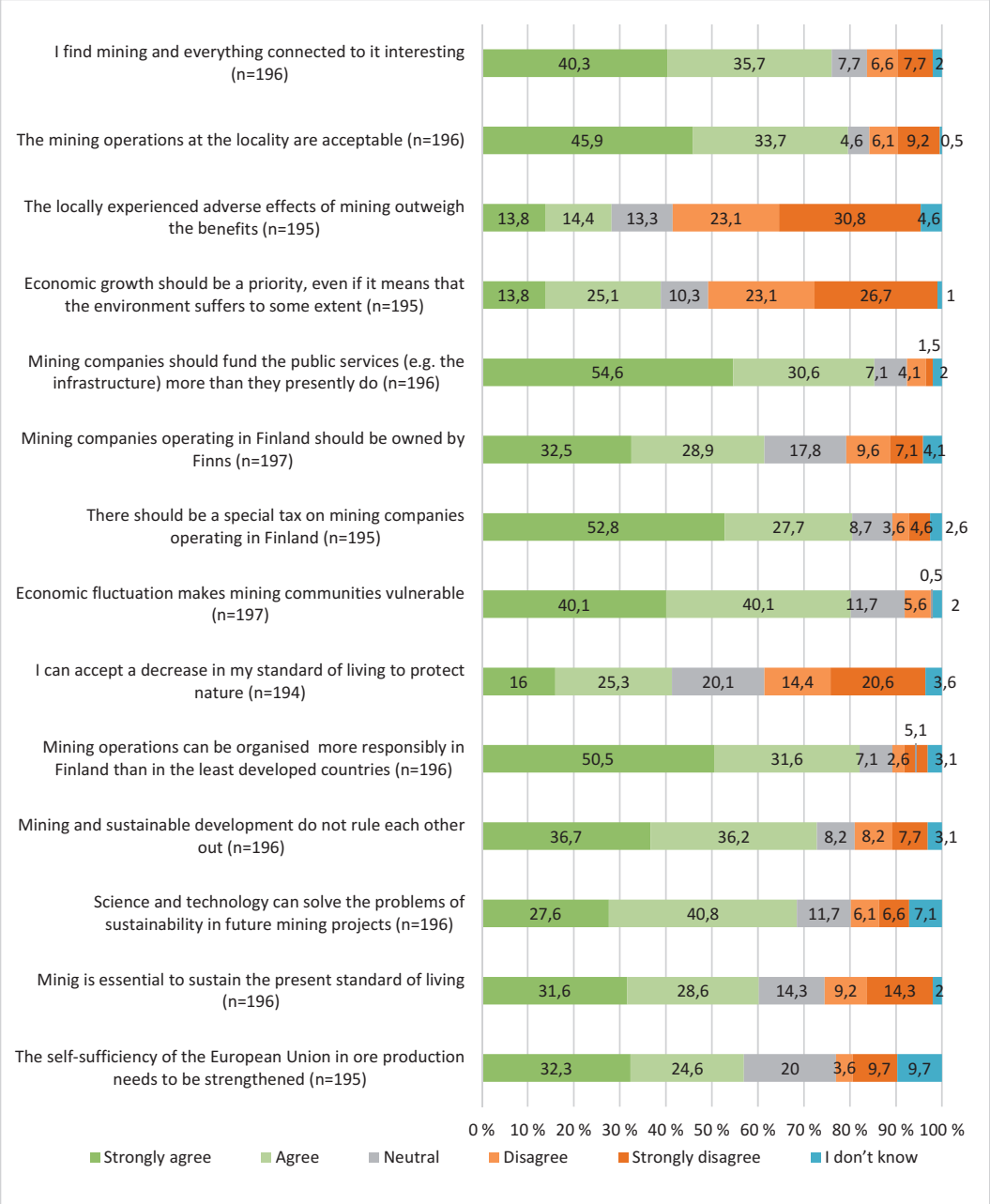


Figure 5. To what extent do you agree/disagree with the following statements? (n=194–197).

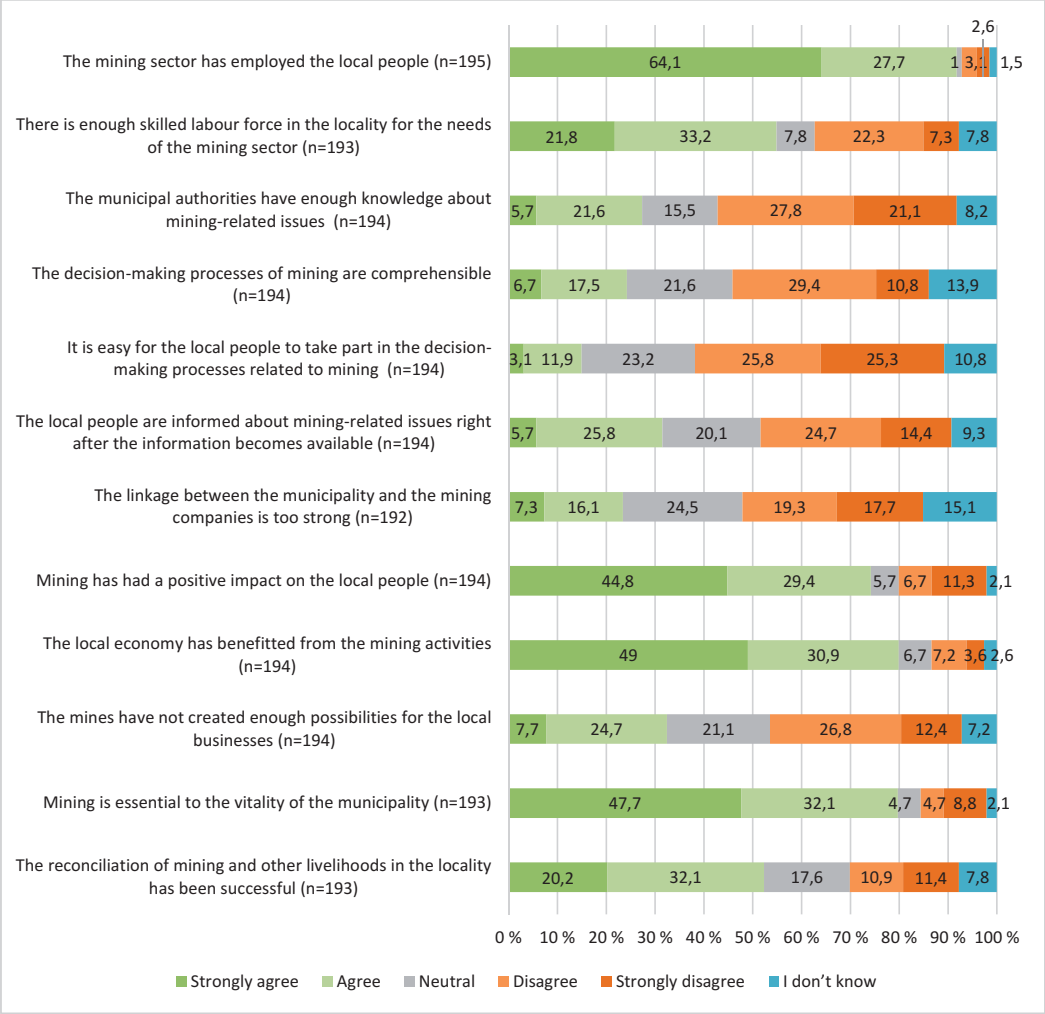
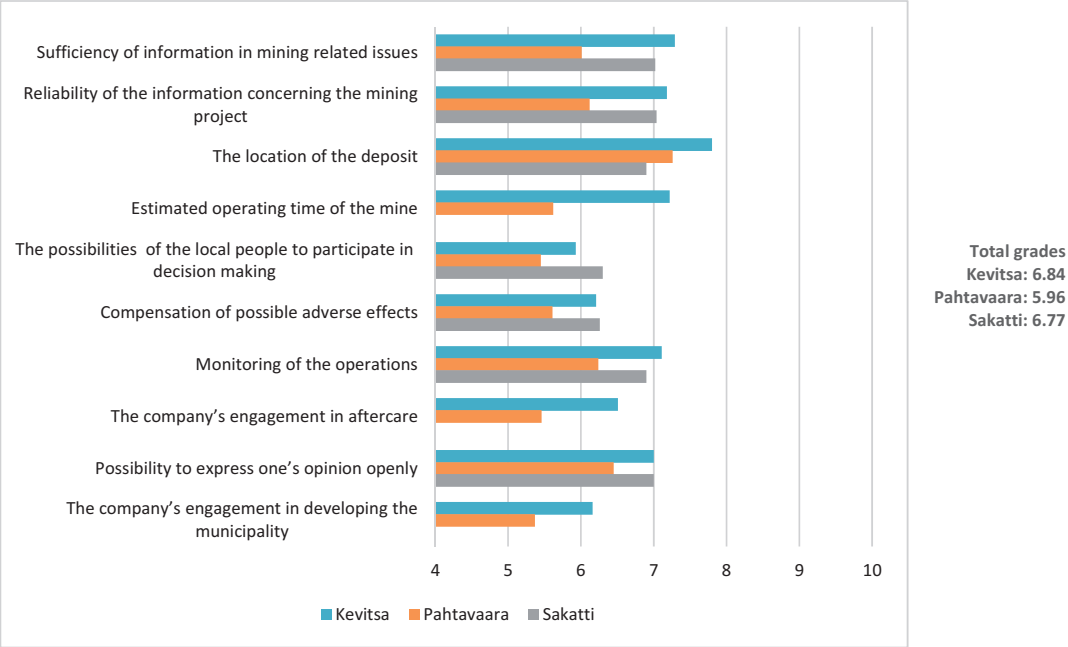


Figure 6. To what extent do you agree/disagree with the following statements? (n=192–195).

Social license to operate and regulatory control



Use the Finnish school grades: 10 outstanding, 9 excellent, 8 good, 7 satisfactory, 6 moderate, 5 passable, 4 unsatisfactory/fail. (n=132–167)

Figure 7. How would you rate the Sakatti research project regarding the following issues?

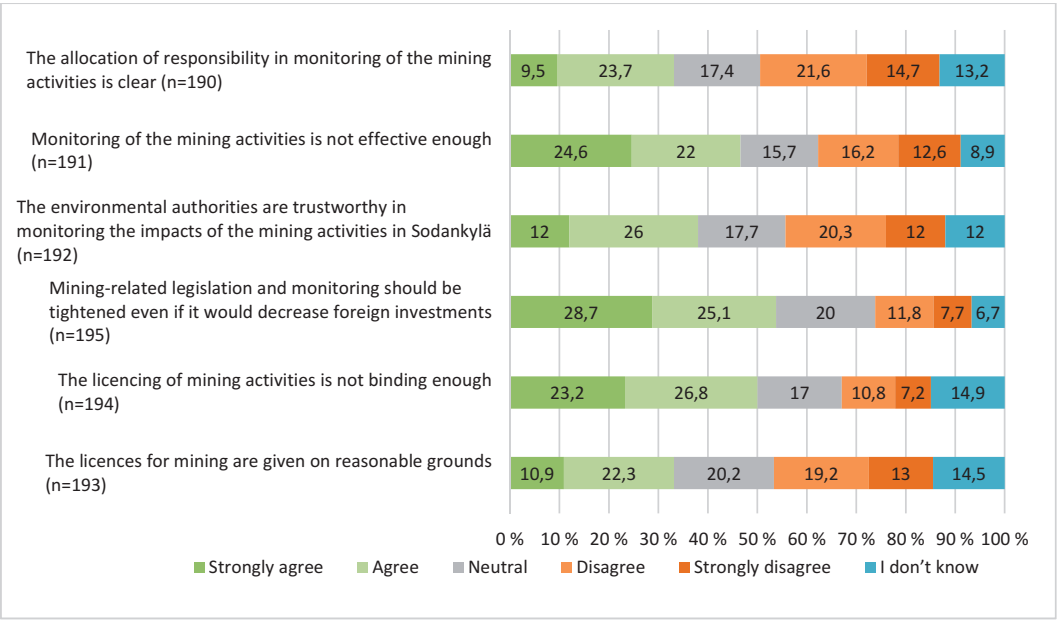


Figure 8. To what extent do you agree/disagree with the following statements? (n=190–195).

Environmental impacts

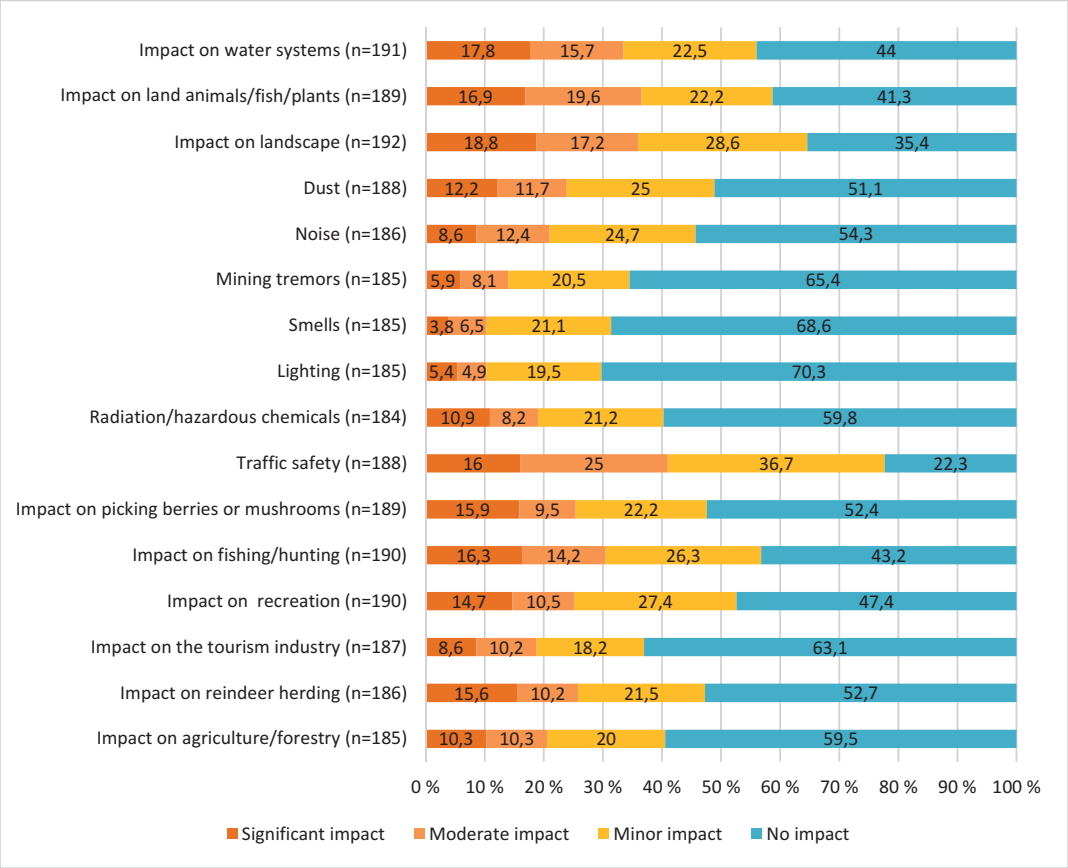


Figure 9. Have you experienced or witnessed any of the following adverse impacts of mining? (n=184–192).