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# **Experienced Impacts of Mining in Sodankylä Follow-up Study**

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# REGINA

Remote communities & resource-based industries



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The study is part 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), whose aim is to promote the development of sparsely populated areas and their ability to benefit from large-scale projects based on natural resources. The three-year project was launched in October 2015 and it encompasses municipalities, regional development organizations, and research institutions in Finland, Sweden, Norway, Scotland, and Greenland. In Finland, the project is run by the University of Lapland and the Municipality of Sodankylä. The project is funded by the Northern Periphery and the Arctic programme. The project is led by the Nordic research organization Nordregio.

## 1 Introduction

There are several ongoing mining projects in various phases in the Municipality of Sodankylä. At the time of writing the report in summer 2018 the Kevitsa mine of Boliden is in the production phase, Rupert Resources is making plans to restart the Pahtavaara mine, and the environmental impact assessment of the mining project of the AA Sakatti Mining Company is being circulated for comments (Ympäristöhallinto 2018). Ore exploration is also taking place in the municipality: for example in winter 2016–2017 there were more than ten international companies exploring ores in the area (Sodankylän kunta 2018). Owing to the scale and future potential of the business, it is important to monitor the impacts of the activity in the region and the way in which opinions toward mining possibly change during the projects.

The impacts of mining and the local residents' opinions were examined in the REGINA project for the first time in summer 2016 (Kuisma & Suopajärvi 2017). The second survey conducted in February 2018 is used to accrue follow-up data on the experienced and mainly social impacts of mining and the local residents' opinions on mining. The aim is to produce knowledge for the Municipality of Sodankylä, the mining companies, and other stakeholders. Another aim of the REGINA project has been to develop various methods of collecting information to follow the experienced impacts of the mining projects in their different phases and after they have ended. The present survey is one of these information channels.

The social impacts of mining can be direct or indirect and positive or negative. They can manifest themselves as various demographic changes, such as the growth of the number of residents or workers residing temporarily in the location. Social impacts can also appear as institutional changes, such as the measures taken by the municipality to increase the production of housing and services. They can also refer to changes in the relations between communities and/or individuals, in the ways to earn a living, or in the working conditions. Further, they can be changes related to the cultural heritage or the environment and manifest themselves as changes experienced in the quality of the surroundings. Finally, social impacts may refer to socioeconomic changes; for example, mining may affect the opportunities to get a job or to run a business, which is experienced as a change in the foundation of material wellbeing. (Suopajärvi & Jungsberg 2016.)

Sustainable mining is based on foreseeing and monitoring each project's individual effects throughout the entire project life cycle (see for example Suopajärvi & Sairinen 2016; Kuisma & Suopajärvi 2017). Social impacts are typically assessed in the planning phase as part of the environmental impact assessment (EIA) process. However, anticipatory social impact assessment (SIA) is unable to specify how the impacts appear in daily life or how they are experienced (Suopajärvi 2015; Kuisma & Suopajärvi 2017).

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 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 the local acceptance of a project. A mining municipality, on the other hand, can use the results of the social impact assessment process in service design and other

municipal development projects. For the local residents the SIA process provides a channel to express mining-related thoughts, concerns, or improvement ideas. (see Kuisma & Suopajarvi 2017, Vanclay et al. 2015; Suopajarvi 2015; Suopajarvi & Sairinen 2016.) The regular assessment of impacts in Sodankylä is one of the measures approved in spring 2018 by the local council to advance economically, socially, and ecologically sustainable mining (Sodankylän kunta 2018).

According to Sanna Hast and Mikko Jokinen (2016), to be socially sustainable a natural resource project is to improve the local residents' influencing channels, employment, working conditions, and skills development. It should also enhance business continuity and development, the supply of free time activities, the functionality of local social systems, the continuity of local culture, and the conservation of scenic and cultural resorts. Hast and Jokinen (2016) also emphasise the temporal dimension of social sustainability. They maintain that operators must advance social sustainability by committing themselves to methods and practices that are not only continuous but also flexible enough to evolve according to the needs of the stakeholders (Hast & Jokinen 2016).

The report takes notice of how the residents of Sodankylä recognise the impacts of mining and what the impacts mean in terms of their daily life. Thus, the definition of social impacts and the factors of social sustainability serve as an observational frame of reference with an emphasis on the experiential nature of impacts.

The following chapter of the report presents the collected material and basic data on the recipients of the survey. The third chapter addresses the impacts of mining from the viewpoints of comfort, services, and infrastructure. It also examines the experienced environmental impacts and their effects on other livelihoods. The fourth chapter discusses the acceptability of mining and the results of the survey on the levels of project-specific and general acceptability. The fifth chapter sums up the main results of the report.

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. If there are differences, for example between women and men, then both percentages are presented. The field diary used as a reference is based on discussions that took place during a village round arranged in the villages near the mine areas or the planned mine areas. The field diary notes have been entered without reference to the individual speakers; no personal data on the participants in the discussions have been collected. The notes have been written from memory after the sessions and they are utilized in the report as complementary material along with the open-ended answers collected through the questionnaire.

## 2 Research material and methods

The aim of the two surveys of the REGINA project was to investigate the experienced impacts of mining and the opinions of residents on mining in Sodankylä. Another aim was to test and pilot various data collection methods that the municipality could utilize in its future planning and development work.

The first survey on the experienced impacts of mining in Sodankylä was conducted in spring 2016 as a mail survey. A follow-up survey was made in February 2018. It was carried out as an open web survey and as an informed survey, which means that the questionnaires were handed out to the respondents personally along with information on the objectives of the survey. The web survey was open between 1<sup>st</sup> and 28<sup>th</sup> of February 2018. The web survey link was available on Sodankylä's web pages and Facebook. All village representatives listed on the web pages of Sodankylä also received the link with a request to pass it on to others. In addition, the survey link was sent to the stakeholders who commented on the form, to the members of the Regina- projects local steering group, and to the representatives of the stakeholder groups who participated in the mining development planning workshops facilitated by Regina project. An announcement about the survey was published in local news paper Sompio in February.

The informed survey was carried out in events arranged in five villages near the operating or the planned mine areas: Moskuvaara, Petkula, Rajala, Sattanen, and Puolakkavaara. Residents from villages of Madetkoski, Kersilö, Kelujärvi, and Siurunmaa were also invited to the events. Information on the events was disseminated in cooperation with the village associations and committees. Participation in the events varied, reaching a total of 36 persons. The questionnaire was also available in paper format at the local library along with a return box.

The mail survey of 2016 was answered by 200 respondents. The follow-up survey received 160 responses, 106 of which were received through the web survey. The remaining 54 were received in paper format in the village events, via mail and to the library's return box. Compared to the mail survey, the web survey proved to be a fast and efficient method of collecting responses. Handing out forms in the open events, on the other hand, proved to be a good channel for interaction, enabling the participants to discuss issues related to mining, to make comments on the survey, and to get answers to questions concerning the study. Fieldwork carried out in the villages near mining areas also gave valuable insights into interpreting the replies received (Field diary 2018).

However, open surveys have a weakness in that they cannot be targeted according to the population structure, for example. Thus, the group of respondents is always biased in one way or another, and one cannot generalise the results in relation to any basic target group. **Owing to the collection method, the results of this report are not statistically generalisable.** The respondents to the follow-up study are mainly employed people and many of them live in the villages near the mining sites. Therefore, the results can be considered as feedback from these people. The material depicts essentially the opinions and experiences of active residents who are interested in mining-related issues and live in the vicinity of the mine areas.

The first survey questionnaire was based on earlier SIAs of natural resource projects and on studies of social impacts, social sustainability, and the social licence to operate (Kuisma & Suopajärvi 2017). The follow-up survey questionnaire was based on the original form by utilising the first survey's feedback

and the comments of the local steering group of the REGINA project. In addition, comments were requested from the Reindeer Herders' Association, Sodankylä Entrepreneurs' Association, Vuotso Sámi Association, and the Viiankiaapa Movement.

Special attention was paid to the anonymity of the respondents throughout the study and in reporting the results. The aggregate answers of an individual respondent were not examined in any phase of the study. The answers of both the web survey and the paper-format survey were entered numerically into the SPSS statistical analysis system. The material has been examined descriptively and the results of the analysis are presented in the report's frequency distribution charts.

## 2.1 Basic information on the respondents

The respondents to the survey represent the business and employment structure of Sodankylä reasonably well. The share of employed persons was rather high; more than two-thirds (67.5%) had a job. According to Statistics Finland the employment rate of Sodankylä in 2016 was 68.4 percent (Kuntien avainluvut 2018).

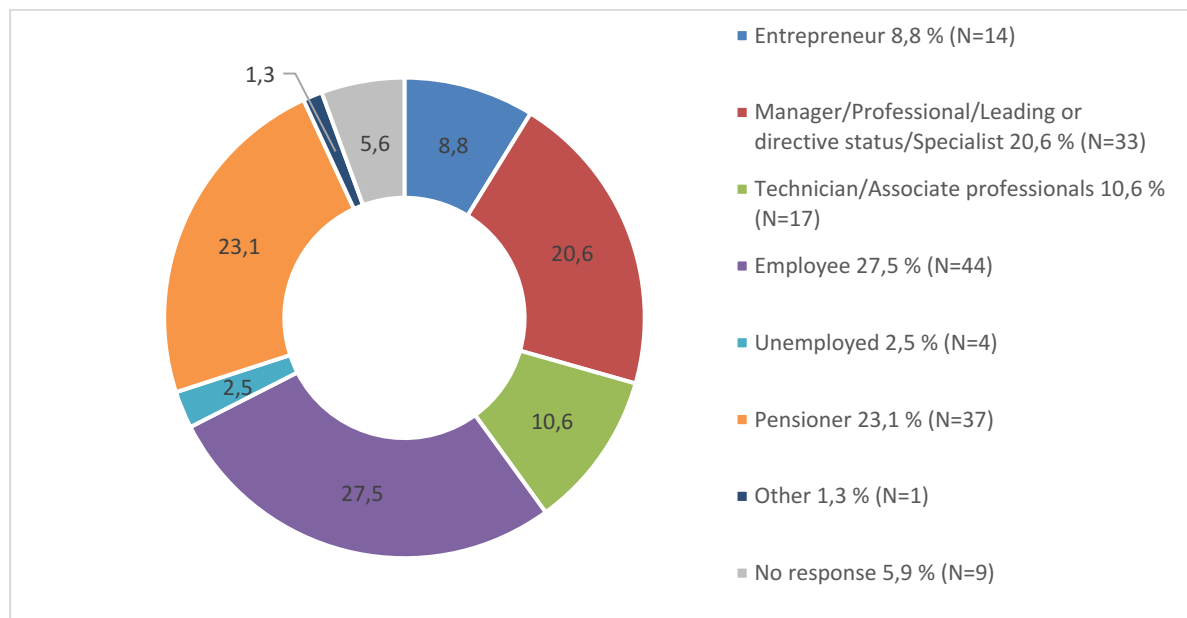


Figure 1 Life situation

The share of pensioners was somewhat low; only one-fourth (23.1%) of the respondents were retired. In 2016 the share of pensioners of people living in Sodankylä was 31.6 percent. Only 2.5 percent of the respondents were unemployed, while according to Statistics Finland the actual figure in 2016 was 13.2 percent. (Kuntien avainluvut 2018.) The share of entrepreneurs, on the other hand, was 8.8 percent, while the municipality's web pages state that their share of the inhabitants was 6.1 percent in 2014 (Sodankylän kunta 2014).

Compared to the preceding survey, the share of employed respondents was larger in the follow-up survey: in 2016 around half (52.5%) of the respondents were entrepreneurs or otherwise employed, while in the follow-up survey their share was more than two-thirds (67.7%). The gender ratio was rather even in the follow-up survey. The share of women was 45 percent (n=72) and the share of men was 54.4 percent (n=87). Only 0.6 percent (n=1) did not announce their gender.

The respondents' age structure represents that of Sodankylä rather well. According to Statistics Finland the share of people between 15 and 64 years of age was 60.8 percent, and the share of people over 64 was 25.9 percent in 2017 (Kuntien avainluvut 2018). In the analysis, the respondents were classified into seven age groups. In terms of age distribution, roughly half (53.5 %) of the respondents were between 40 and 59 years of age.

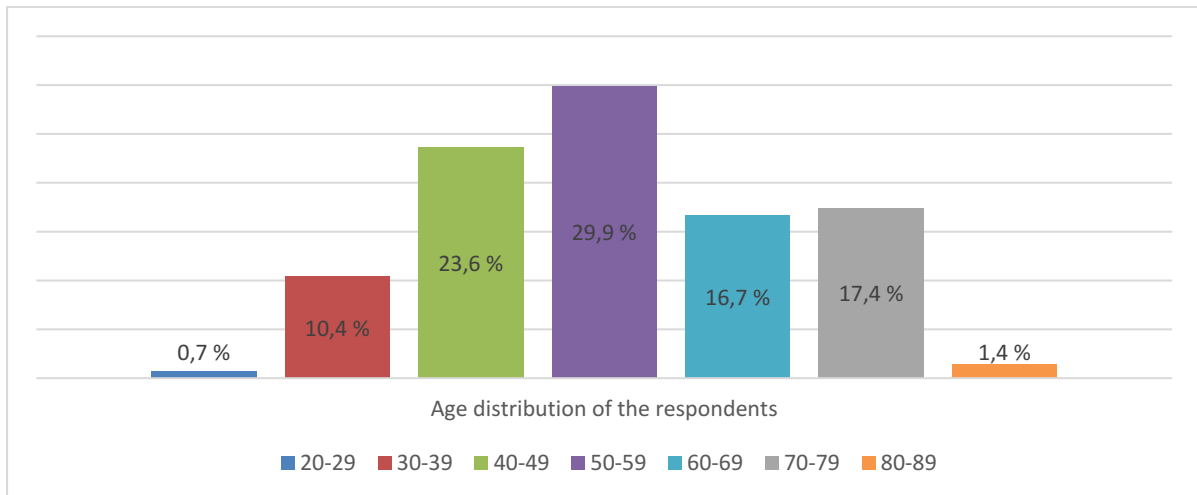


Figure 2 Age distribution

Although the share of working-age people is large, people under the age of 40 constitute a minority in the material. When the survey is repeated in the future, it is important to direct the communication efforts toward secondary school and upper comprehensive school students in order to involve more young people.

Based on the respondents' place of residence, three classes were formed: the municipal centre, vil- lages, and the villages near the planned or operating mine areas. The villages near the operating and planned mine areas were Moskuvaara, Petkula, Rajala, Sattanen, Kersilö, Kelujärvi, Siurunmaa, and Puolakkavaara.

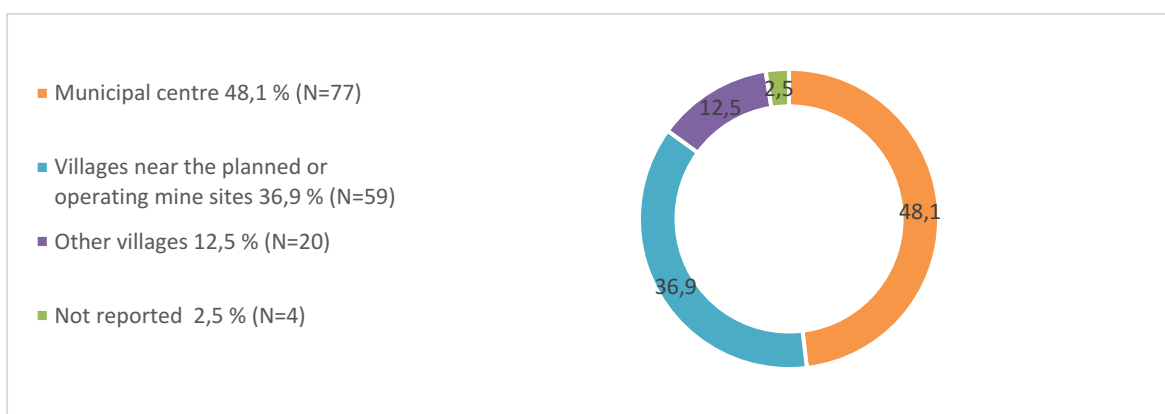


Figure 3 Place of residence



Slightly over a third (36.9%) of the respondents lived in the villages near the planned or operating mining areas, while 12.5 percent lived in the other villages. Around a half (48.1%) lived in the municipal centre and 2.5 percent did not state their place of residence. Compared to the survey of 2016, the informed survey reached more people living in the villages near the planned and operating mine areas in proportion to the number of respondents. In 2016 more than half (53%) of the respondents lived in the municipal centre, while the share of people living in the villages near the mine sites was 23 percent (Kuisma & Suopajarvi 2017). The strong representation of the villages near the mining areas indicates that an informed survey is an efficient method of collecting responses.

### 3 Experienced impacts of mining

#### 3.1 Attractiveness, services, and infrastructure

The first part of the follow-up survey focused on the respondents' views and experiences on Sodankylä as a place to live. The respondents were asked to assess the services, infrastructure, and other factors affecting the attractiveness of the area. According to Figures 4 and 5, the inhabitants of Sodankylä are satisfied with municipality in general.

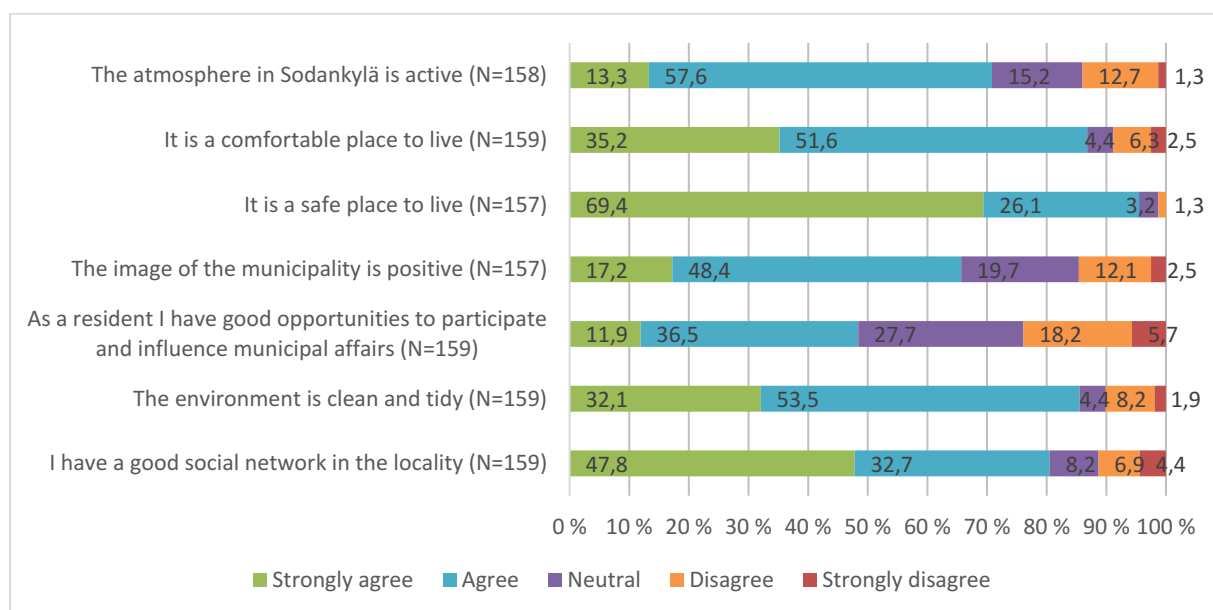
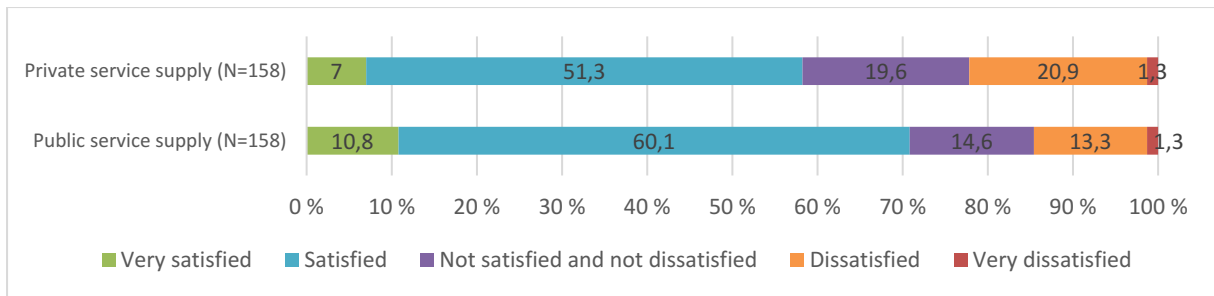


Figure 4 General attractiveness

Sodankylä was considered an attractive place to live. The respondents appreciated particularly its safety and clean environment. The atmosphere was considered good, and most of the respondents (80.5%) had meaningful relationships within the area, which means that they were satisfied with their social networks.

The amount of dispersion was at its greatest when the respondents were asked about their possibilities to participate in and to influence municipal decision-making. Roughly a half (48.4%) considered their influencing possibilities good, but almost a fourth (23.9%) did not. Less than one-third (27.7%) could not state a clear opinion on the issue. The large number of neutral replies may be due to the fact that some of the respondents have not been actively involved in decision making and therefore have no experience on the issue.

Figure 5 (below) shows that most of the respondents were satisfied with the municipal services (70.9%) and with the private ones (58.3%). However, this time the respondents were more dissatisfied with private services than in the previous survey. In the 2016 survey, 77 percent of the respondents were satisfied with private services, but in the follow up survey their share was only 58.3 percent (see Kuisma & Suopajarvi 2017).

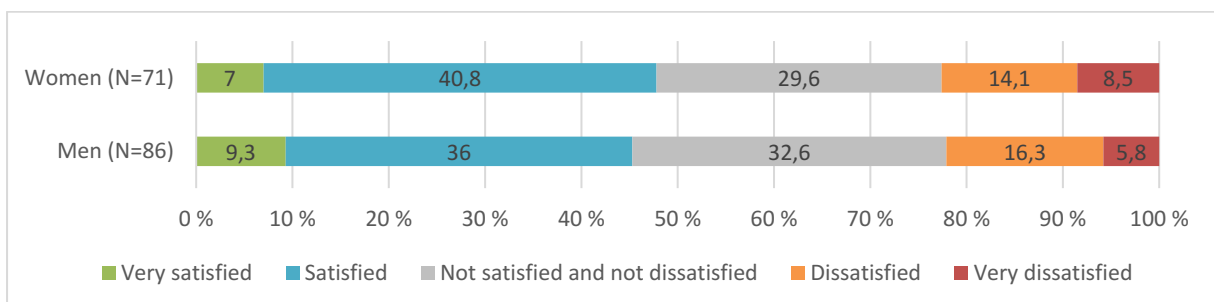


**Figure 5 Satisfaction with public and private services**

The difference is not explained by the fact that a larger part of the respondents lived outside the municipal centre and that poorer access to services would have been behind the dissatisfaction. People were more satisfied with private services in the villages than in the municipal centre (municipal centre 52.0%, mine villages 66.7%, other villages 55.0%). It is worth noting that the assessments matrix was altered in the follow-up survey and former option "I don't know" was replaced with "not satisfied and not dissatisfied" which may partly explain the difference.

Based on discussions in the village events, many residents are disappointed by the fact that several businesses have closed down permanently regardless of the active mining operations in the area (see also Kuittinen 2018). Reduced services may thus partly explain the increased dissatisfaction. According to the open-ended replies, however, the mining operations "have changed the streets, increased the supply of the businesses, and raised the overall level of activity a great deal" (R85). Some of the respondents thought that mining has "kept up the supply of services" (R43) and that without it, the situation could be worse than it is now.

The respondents were also asked to assess their employment, career, and educational opportunities in the region. The majority (46.2%) were either very or moderately satisfied with their employment and career options in Sodankylä. Roughly a third (31.6%) did not have a clear opinion and over a fifth (22.2%) were dissatisfied with their employment and career opportunities.



**Figure 6 Satisfaction with employment and career opportunities by gender**

The difference between men and women was not significant in this respect; women were slightly more satisfied with their employment and career options (women 47.8%, men 45.3%). It is worth noting that most of the respondents were employed and that the share of unemployed was 2.5 percent, which increases the probability of satisfaction with the employment situation.

Educational opportunities, however, were not met with praise. The share of respondents who were satisfied with them was 27.5 percent. About a third (34.6%) were not able to state a clear opinion, and

a majority (37.8%) were dissatisfied with educational opportunities in the region. The figure below shows that women were more dissatisfied with their educational options than men; 45.1 percent of the women and 30.9 percent of the men were dissatisfied. In the 2016 survey there was one question concerning educational and employment opportunities. Even then, women were more dissatisfied with their opportunities compared to men, but the results are not comparable as such, because the follow-up survey had separate questions on employment and educational opportunities (see Kuisma & Suopajarvi 2017).

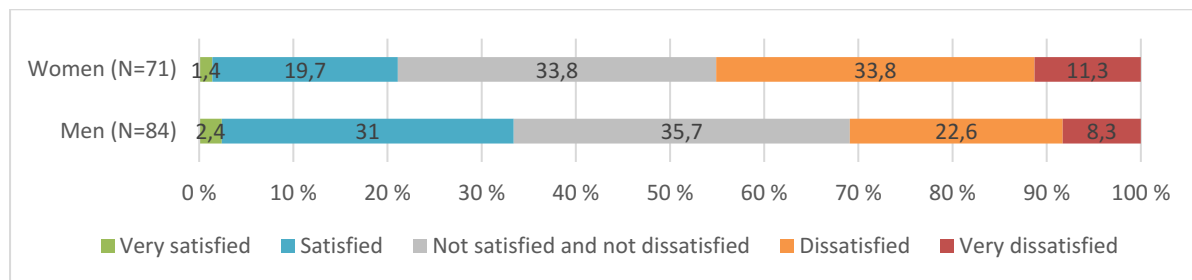


Figure 7 Satisfaction with educational options by gender

Women’s dissatisfaction may be explained by the fact that they engage in university-level studies more often than men, and there are no such studies available in the municipality (see for example Hirvonen 2018). On the other hand, it may also be possible that women are not interested in the educational supply of the municipality. Educational choices are strongly gendered, and women gravitate toward social and health care or education fields more often than men. Men, for their part, tend to choose technology (Murto et al. 2018). In the regional supply of education male-dominated technical fields form a majority, while practical nurse training is the only line of education that is clearly female-dominated. To top it all up, the training that leads to a basic degree in mining graduates “mining men” (Redu 2018).

The mining industry is strongly male-dominated: for example in Sodankylä in 2016 the share of female workers in the Boliden Kevitsa mine was only 26 percent (Syrjälä 2016; Kuisma & Suopajarvi 2017). In terms of the labour market as well as education, it would be important to tear down the gendered occupational attitudes that often influence our choices concerning employment and education. Differentiation in the education and labour markets is problematic especially for local economies that lean on a particular branch of industry, for example mining, because differentiation may lead to a shortage of workforce in occupations that are dominated by one gender. (Murto et al. 2018.) Getting rid of gendered educational and occupational preferences is challenging, but for example in the mining industry, employers can ensure that they provide diverse vocational role models for youths and open and safe workplace cultures for all genders (cf. Murto et al. 2018, 8). In addition, vocational titles or degrees should not be connected to one gender only.

The second part of the survey concentrated on the effects of mining on the attractiveness, services, and infrastructure of Sodankylä. Most of the respondents saw that mining has improved the atmosphere and attractiveness of the locality. The effect of mining on the public image and conceptions of Sodankylä was also considered positive; most of the respondents (71.3%) saw that the image had improved. In a regional comparison, the most positive evaluation of the image effect came from those

living in the municipal centre (74.1%) and from those living in the mine villages (72.9%). Other villages were a bit more critical, but the share of those who had a positive view was still quite large (65.0%).

Most of the respondents (60.1%) saw that mining has increased their opportunities to establish new and meaningful relationships. Two-thirds (66.3%) of the people in the municipal centre and half (50.0%) of the people in the villages felt that way. Also in the mine villages the majority (55.9%) saw that mining has improved their chances to create new social relationships.

There were also different views on the issue. Many respondents said that moving to a remote region makes it difficult to maintain social relations: “Employment and career opportunities in mining and ore exploration are often in remote regions, which has sometimes made it hard to keep up a relationship and other social connections” (R52). “Social networks and family life suffer” (R51) as mining takes place in Sodankylä, away from family and friends. Based on the open-ended answers, it may also be difficult for miners to get settled in the location or to create new relationships, because “working for a mining company gives a certain kind of an impression, sometimes even a wrong one, of me as a person” (R62).

During discussions on the village round it turned out that people in the mining villages have hoped and expected new workers to settle in the mining villages instead of the municipal centre. However, the opposite has occurred and the villages keep losing residents like elsewhere in the municipalities of Lapland (Field diary 2018). According to the respondents, the large share of visiting workers is due to a lack of economic diversity (no work to be found for spouses) and the way in which the rotation of work has been organised by the company: After an intense period of work the workers get a long leave, during which they can go back to their families and friends in another locality (Field diary 2018). The respondents also surmised that a lack of housing and services might be the reason: “It is quite unfortunate that the municipality hasn’t succeeded in getting more workers to commit themselves to the locality. There is not enough housing, and the service structure does not allow more people to move into the village” (R35).

Based on the replies, mining had not affected security in the locality; only a minority (13.8%) of the respondents thought that the security situation had deteriorated. Respondents from the villages further away from the mines worried the most, 15 percent of them said that security had deteriorated because of mining. In 2016 the respondents were more critical about changes in the security of their locality; back then 26.3 percent felt that mining had affected the security situation (Kuisma & Suopajärvi 2017). This may be because the respondents to the first survey linked the question to traffic safety, whereas in the follow-up survey a more specific reference to general safety was made.

Mining, however, has not brought about only positive things. Half of the respondents (49.4%) said that it has had adverse effects on the environment and nature. In addition, there were differing opinions regarding the residents’ opportunity to influence mining-related decision-making. Environmental impacts are discussed further in section 3.2, while section 4.3 focuses on the local residents’ participation and influencing opportunities.

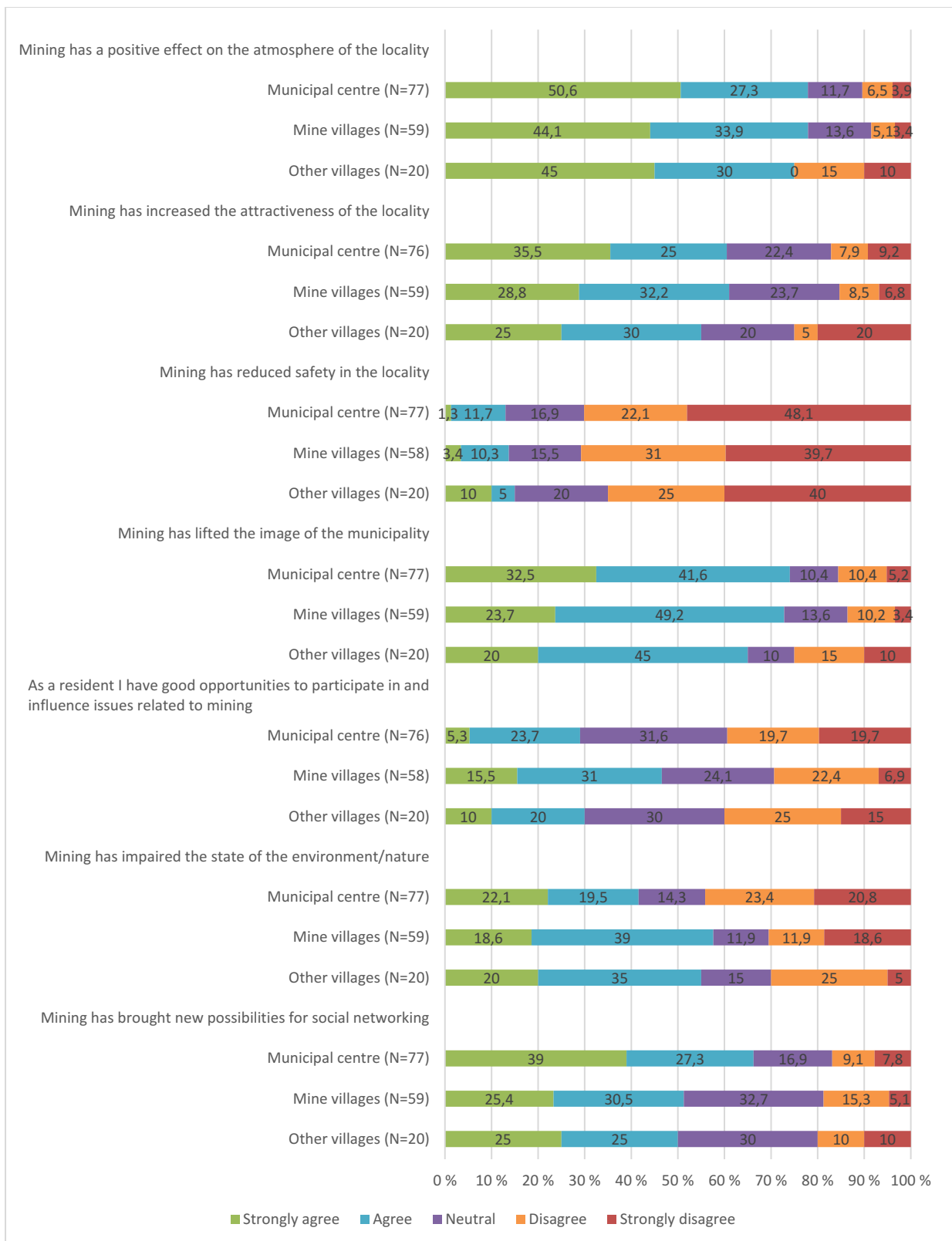


Figure 8 Effects of mining on attractiveness by region

Most of the respondents (86.9 %) thought that mining had increased employment and career opportunities in the locality (women 86.1%, men 87.1%). Likewise, a majority (67.8%) thought that mining has had a positive effect on educational opportunities in the region (women 63.7 %, men 70.2%). For

many, mining and new jobs have meant an opportunity to “live in Lapland and in Sodankylä” (R5) (see Suopajärvi 2017, Saariniemi 2017).

According to the replies, mining has barely affected the municipality’s supply of cultural and other events or the operation of associations providing free time activities. Almost two-thirds (60.3%) felt that mining played no role whatsoever in the operation of associations and a majority (73.2%) thought that it had not affected the supply of cultural events. Studies conducted previously as part of the REGINA project have shown that people in Sodankylä wish for more family events and organised low-threshold activities, through which for example new residents could more easily integrate themselves into the region (Saariniemi 2017; Kuisma 2016).

The most negative experiences were related to housing costs: “Rents have been terribly high after the mine arrived” (R33). For some, finding an apartment had proved difficult: “When we moved to Sodankylä, it was hard to find a rental apartment” (R1). And as one respondent put it, “Also the apartments that are for sale are overpriced” (R41). On the other hand, the higher prices have led to a seller’s market: “I cashed in when I sold my apartment,” said one of the respondents (R44). Some wished for a future rise in the value of their apartment or property, should the local mining operations eventually expand (R1; R149). The rise in the rent level and the availability of rental apartments were emphasised as negative effects also in the 2016 survey and in studies on the settlement of new miners (see Kuisma & Suopajärvi 2017; Suopajärvi 2017; Saariniemi 2017).

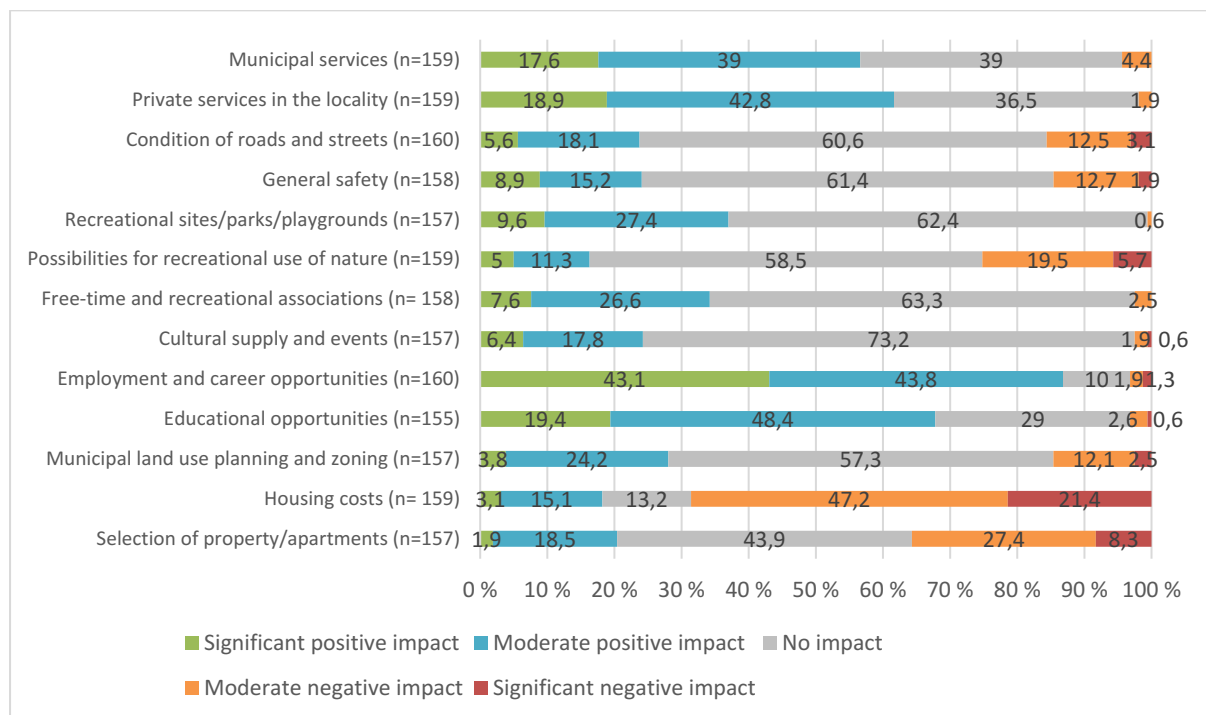


Figure 9 Effects of mining on the services and attractiveness of the area

In terms of the attractiveness, services, and infrastructure of the region, there are no major changes in the way people have experienced the effects of mining, except for a growing dissatisfaction with the supply of private services. Based on the results of the 2016 survey and the follow-up survey, the greatest benefit of mining has been the increased attractiveness and liveliness of the municipality,

which was attributed to the jobs brought by mining. The negative sides of mining included the experienced decay of the environment and the high prices of rental apartments.

### 3.2 Environmental impacts

Sizable natural resource projects always have some environmental effects. These effects concern the natural environment (soil, water, flora, and fauna) and the constructed environment such as roads, buildings, and built landscapes. Environmental impacts also concern people indirectly: When a mining project enters a locality, the residents are often confronted with a value conflict between positive employment and development prospects and negative environmental impacts and risks. Environmental risks frustrates especially those who live close to the mines and who deal with the consequences. (Mononen 2016.)

Half of the respondents to the follow-up survey thought that mining had impaired the state of the environment and nature in Sodankylä (see Figure 8). The analysis of environmental impacts by region in Figure 10 shows that adverse effects are emphasised in the villages near the operating and planned mines, where 57.6 percent of the respondents thought that the state of the environment had deteriorated because of mining. The corresponding figure was 46.1 percent in the municipal centre and 55.0 in the other villages. In many cases the residents of the other villages were more critical about environmental impacts than the respondents of the municipal centre and mine villages.

Adverse effects were considered minimal in terms of lighting, radiation, hazardous chemicals, odours, and tremor. As was seen in the 2016 survey, a drop in traffic safety was considered the greatest adverse effect. Nearly all of the respondents (84.8%) had noticed a decline in it after the arrival of mining. Less than a third (28.9%) thought that the effect was minor and more than a half (55.9%) thought it was moderate or significant. Besides traffic safety, changes in the landscape were considered to be among the most significant adverse effects in both surveys. Most of the respondents (75.8%) to the follow-up survey had noticed scenic impairments ranging from minor to significant. In a regional comparison, impacts on the landscape had been noticed almost equally both in the municipal centre and in the villages (municipal centre 76%, mine villages 75.9%, and other villages 75%).

As a whole, compared to the 2016 survey the respondents to the follow-up survey were more critical about mining's effect on traffic safety. In the previous survey, 77.7 percent of the respondents thought that mining had affected traffic safety adversely to some extent, whereas in the mine villages almost everyone (93.4%) felt that way (Kuisma & Suopajärvi 2017). In the follow-up survey the regional differences were not as great. Some of the most critical opinions on traffic safety came from the municipal centre, where 84.1 percent had noticed adverse effects ranging from minor to significant. In the mine villages the corresponding figure was 81.3 percent and in the other villages as high as 95.0 percent.

The experienced decrease in traffic safety may be partly due to the fact that the environmental impact assessment matrix was altered in the follow-up survey. This was done in an attempt to get a clearer measurement of the impacts observed personally by a respondent. Owing to the changed assessment matrix the results of the two surveys are not fully commensurable, but the result may also be a sign of the respondents' growing dissatisfaction with traffic safety in the municipality. The respondents were worried about the growth of traffic and the poor road conditions: "The roads are in a bad shape,



the traffic has increased, and thereby traffic safety has become worse" (R12). Traffic safety also roused discussion on the village round, where people were especially worried about the poor condition of the roads and the unlighted crossings providing access to the main highway.

Based on the survey, mining has restricted the recreational use of nature. In the mine villages more than half (55.9%) of the respondents had noticed adverse effects of this type. Also in the other villages a large proportion (55.0%) of the respondents had noticed adverse effects restricting the recreational use of nature. In the municipal centre two-fifths (40.0%) had noticed these effects. Especially fishing, hunting, berry picking, and mushroom picking have been hindered by mining (see Figure 10).

Also in the open-ended answers people were annoyed by "lost fishing waters and hunting grounds in familiar regions" (R25). They also did not want to eat berries, mushrooms, fish, or game like they used to: "Exploiting nature's offerings has diminished near the mine," says one of the respondents (R34). The respondents were worried for example about various water- and dust-borne "residues" (R155) and one of them "no longer eats fish caught below the mines" (R127). People believe that mining has also reduced fish stocks: "River Kitinen is very badly polluted, fishing there isn't what it used to be" (R32). Information plays a vital role in reducing fears and suspicions related to mining. The respondents' concern means that the residents need current and unbiased information about the effects of mining on the waters and on the quality of nature's offerings.

Three-fifths (61.1%) of the respondents had observed dust in the environment. Adverse effects of dust had been observed in the municipal centre by more than half of the respondents (58.7%), but the observations peaked in the mine villages (mine villages 67.3%, other villages 50%). One respondent reported having seen dust on the snow while skiing: "There are sounds emanating from the mine, and when skiing on the mires and bogs I've seen grey spots on the snow" (R77).

Dust gets airborne from ore extraction, crushing, and transportation (Mononen 2016). However, discussions during the village round indicated that in addition to being directly connected to mining, the observed dust problem is also due to the overall growth of traffic. The debaters said that in addition to dust, heavy traffic also causes noise and, near the highway, even tremors (Field diary 2018). Dust from mining and traffic can impair the air quality, but according to the open-ended answers, dust was primarily seen as a visual problem that also affects the quality of wild berries. On the other hand, those who work at a mine may be exposed to dust that poses a direct health hazard (MineHealth 2015).

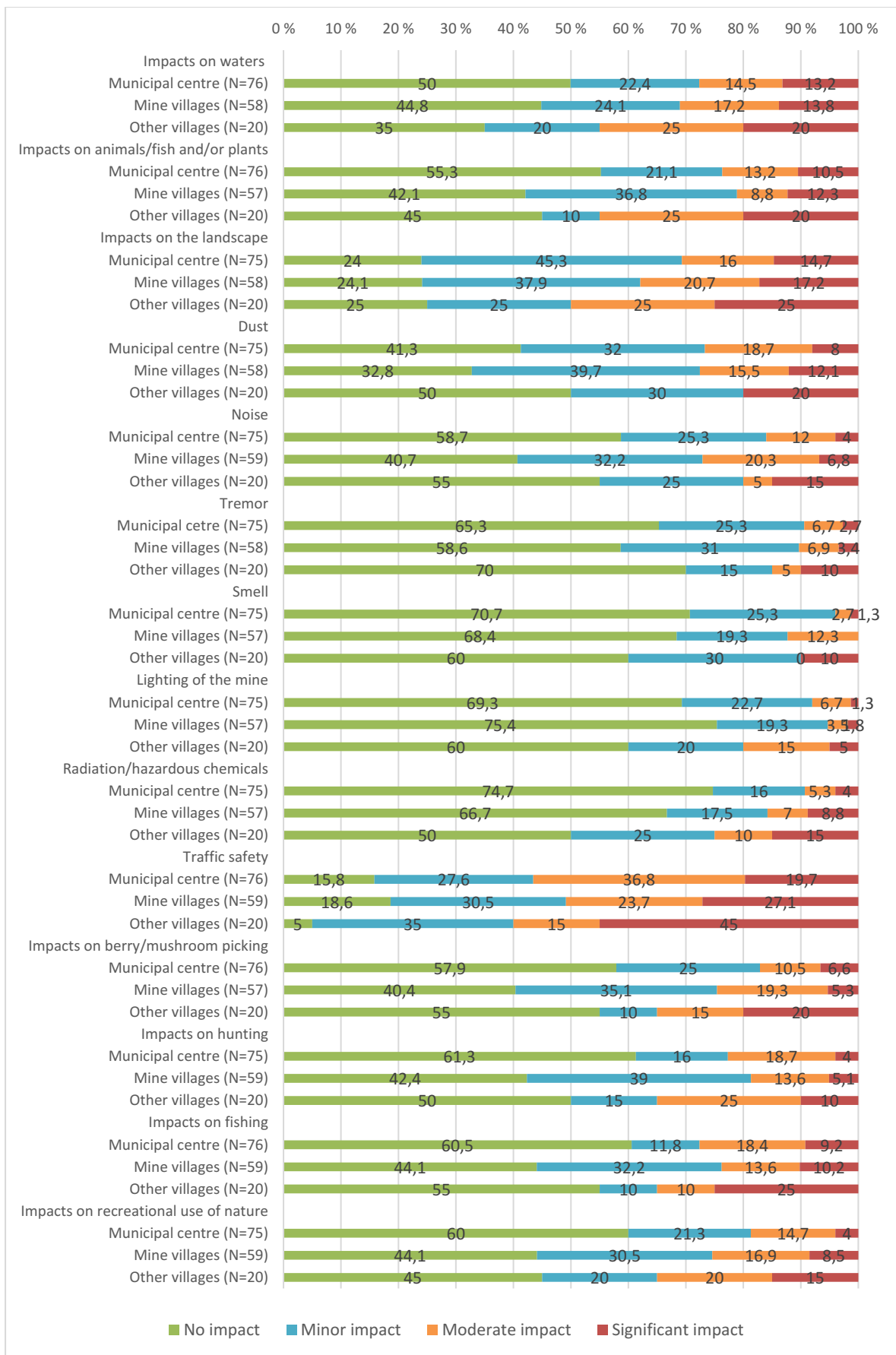


Figure 10 Experienced environmental impacts by place of residence

### 3.3 Impacts on other livelihoods

In the follow-up survey the respondents were also asked to assess the impacts of mining on other livelihoods. Almost all respondents (93%) thought that mining had benefitted trade substantially more than other livelihoods. According to the replies, agriculture and forestry have not benefitted from mining, but they have not suffered from it, either. As for tourism, roughly half of the respondents thought that mining has not affected the industry in the region.

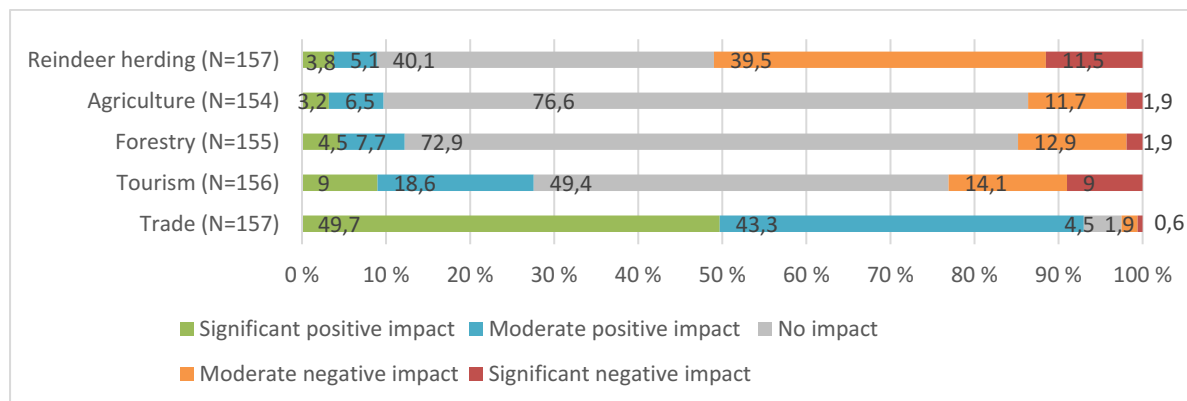


Figure 11 Impacts of mining on other livelihoods

About one-fourth of the respondents (27.6%) thought that local tourism industry has benefitted from mining in Sodankylä, while another fourth or so (23.1%) replied that mining has harmed the industry. Sodankylä’s most important tourism destination is Luosto, a skiing and tourism centre located relatively far from large-scale mining projects (70–100 km). Luosto also hosts the Lampivaara amethyst mine, which is mostly a tourist attraction; nothing is extracted with machines or sold as raw material. Therefore, the amethyst mine cannot be compared to large-scale mining projects (Ametistikavos.fi 2018).

As in the survey of 2016, the respondents thought that mining has impacted reindeer herding more than any other livelihood; roughly half (51.0%) thought that it has harmed the livelihood (47.3% in 2016). Only 8.9 percent considered the impacts to be positive. Two-fifths (40.1%) saw that mining has had no effect on reindeer herding in Sodankylä.

The future of reindeer herding depends on sufficiently clean and spacious natural grazing land. According to the Reindeer Herders’ Association, mining in the reindeer husbandry area is always a risk for the livelihood. Its inevitable effects on reindeer herding include direct and indirect loss of grazing land, disturbances to the circulation of grazing areas, and thereby more work and expenses. Increased traffic also creates its own problems. The Reindeer Herders' Association has noted that in terms of reindeer herding, the most unpredictable risks relate to airborne dust and contamination of water. (Reindeer Herders’ Association 2018.) Based on the open-ended answers, mining increases reindeer herders' expenses, but it also has deeper implications for the livelihood and reindeer herding as way of living: “Additional expenses hit the wallets of those who already depend on nature. And some of the losses (...) cannot be covered by money” (R84).

## 4 Acceptability of mining in Sodankylä

### 4.1 Social license to operate

Especially in mining, the social license to operate has been a widely used concept that has also had many interpretations. In the mining industry, its definition is strongly linked to the idea that local residents' expectations of a company or the company's reception in the locality may determine the company's access to resources essential to its operation, for example land and water (Owen & Kemp 2012, 3). Put simply, the social license to operate means getting the local residents' approval for mining activities. A missing license could lead to project delays or even withdrawal of funding and thereby termination of the project.

Defining the social license to operate as the approval of the local residents emphasises the significance of interaction and interchange between the local community and the mining company in the construction of approval (Rantala et al. 2016). This definition, however, comes with certain restrictions. For example, John R. Owen and Deanna Kemp (2012) have criticised notions about the social license to operate as an informal approval given by local residents, because it muzzles marginalized groups and reduces the diversity of opinion. However, understanding the license as an informal approval given by local residents is beneficial, because it emphasises the social aspect of the concept. Viewed from the perspective of social approval the concept focuses the attention on the people who are directly affected by mining. (Pettersson & Suopajarvi 2018.)

The research literature has recognised many preconditions for gaining and maintaining a social license to operate, the most important of which are open and active communication and interaction, guaranteeing the participation of the local residents, and the company's commitment to local development (for example Kuisma & Suopajarvi 2017; Jartti et al. 2014, Kokko et al. 2013, Vanclay et al. 2015). The follow-up survey attempted to outline these factors by asking the respondents to assess various statements related to acceptability of mining activities in general and per project.

### 4.2. Acceptability of mining

To specify the preconditions for the social license to operate and for the acceptability of mining the respondents were asked to assess various statements and questions related to the mining companies' communication and interaction, the supervision of mining, participation of the local residents, and the acceptability of mining.

The respondents' attitudes toward mining were quite positive. Mining operations in the locality were considered acceptable by 85 percent of the respondents. Compared to the survey of 2016 acceptance was now higher. Back then 80 percent of the respondents considered mining activities acceptable. Mining builds trust in the future and it was considered important for the vitality of the municipality. Majority of the respondents (85.6%) thought that mining has benefitted the local economy. Two-thirds (64.4%) also wanted to ensure a good operating environment for mining operations in the municipality. According to Thomson and Boutilier (2011), the economic benefits of a project for local

stakeholders is the first requirement for acquiring the social license to operate. Based on the survey, this precondition has been met in Sodankylä.

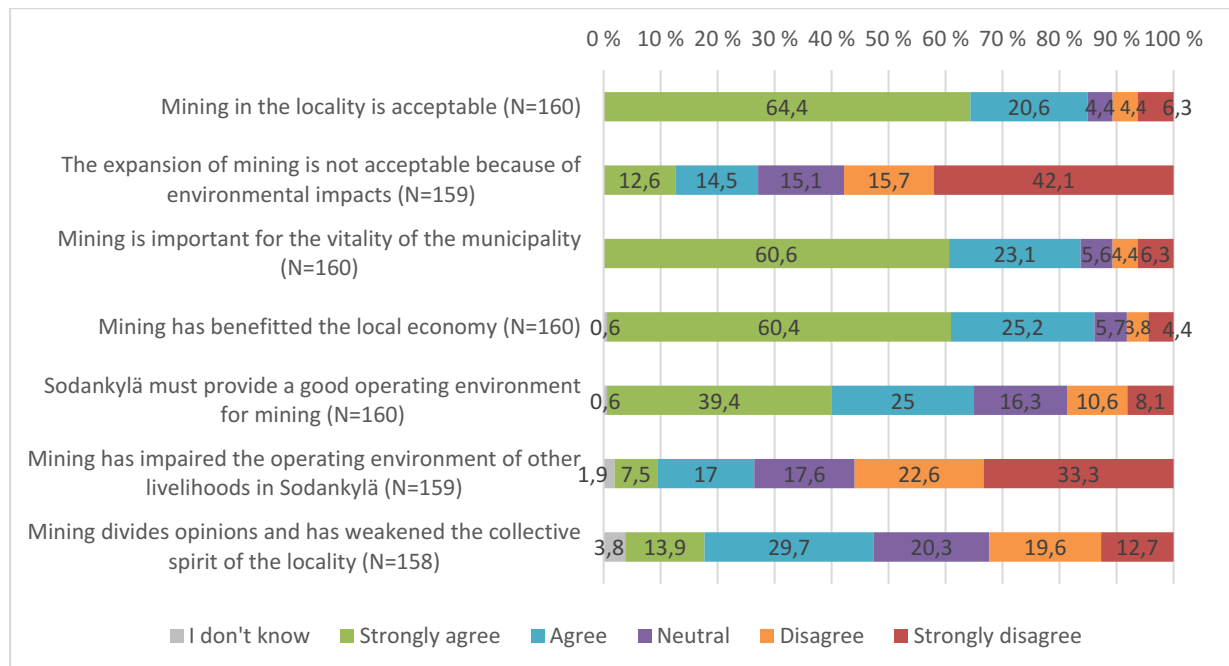
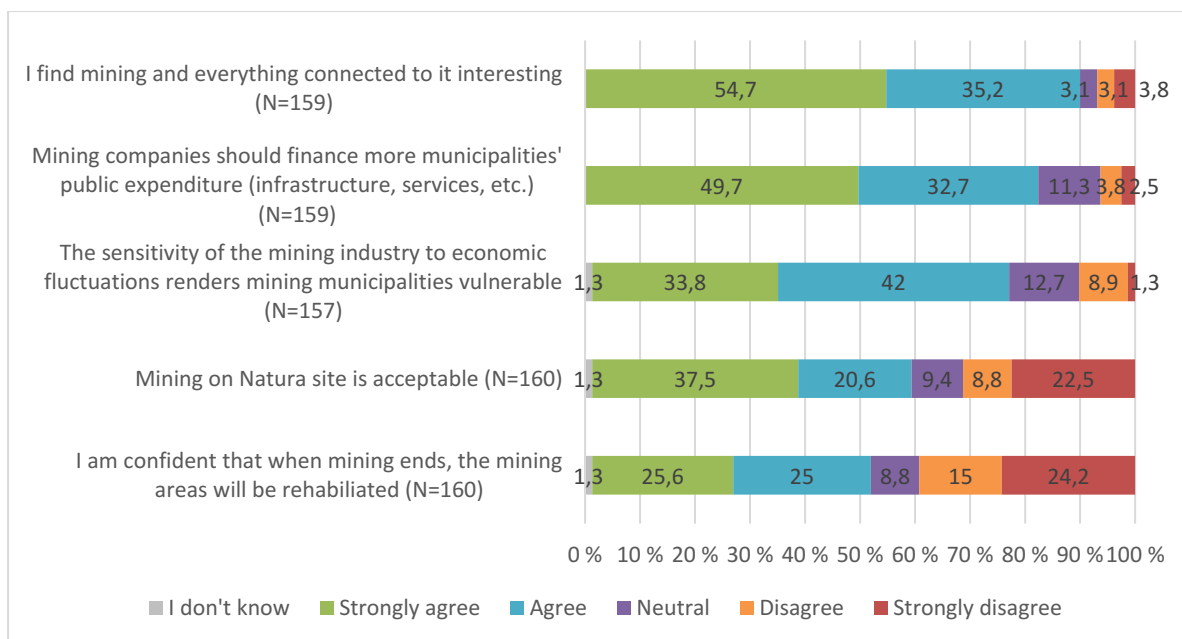


Figure 12 Acceptability of mining in Sodankylä

The respondents’ attitudes toward the expansion of mining were also positive, but compared to the question on acceptability the support was not as unreserved. Almost three-fifths (57.8%) thought that expansion is acceptable. However, people were worried about cumulative effects and “a life between two mines” (R140) resulting from a potential expansion. In Sodankylä, expansion would mean that the AA Sakatti Mining Company’s project proceeds to the construction and production phases. The deposit is located on the western side of Viiankiaapa, a protected bog that is also part of the Natura 2000 network (Ympäristöhallinto 2018).

Opinions dispersed when the respondents were asked to assess the effects of mining on solidarity within the local community. Roughly two-fifths (43.6%) saw that mining divides opinions and has thereby weakened the team spirit of the community. A third (32.3%) thought that solidarity has not been affected and a fourth (24.1%) did not take a clear stance on the issue.

There was also dispersion regarding decommissioning procedures. Two-fifths (39.2%) did not trust that the mining sites will be rehabilitated after the mines are closed. Half (50.6%) of the respondents were trustful and the rest did not take a clear stance. It will likely take decades until the mines are closed, but in view of a general concern for future generations and sustainability, issues pertaining to mine closure are important in social impact assessment already during the planning and operation phases.



**Kuvio 13 Acceptability of mining**

Although environmental impacts raised concerns, a majority (58.1%) of the respondents were willing to accept mining in an area that is part of the Natura 2000 network. About a third (31.3%) were against mining in a Natura zone and the rest (10.7%) could not take a clear stance on the issue. The rather wide acceptance could mean that the respondents wanted to support the progress of the Sakatti project, which received the highest ratings in the assessment of the three mining projects (see Figure 15).

The respondents were also worried about the sensitivity of the mining business to economic fluctuations. Most of the respondents (75.8%) thought that it will reflect on the mining localities and render them vulnerable. They feared that the end of mining would "wither the businesses of the village altogether" (R29) and that mining is developed "(...) at the cost of the village's nature image" (R84). Nature businesses, tourism businesses, and natural livelihoods were believed to employ local residents if they would be supported "as much as the future of mining is being supported now" (R84). A diverse local business structure was seen as a safeguard against economic fluctuations in the mining industry.

### 4.3 Regulatory control and participation in decision-making

The respondents were also asked to assess regulatory control, permit-related issues, and the residents' opportunities to engage in mining-related decision making. The survey addressed decision making through three sets of questions that are presented in Figures 8 and 14 and in the project-specific assessment of Figure 15.

The respondents' trust in mining-related regulatory control was weak. Less than half (43.7%) thought that environmental permits are given to projects openhandedly and two-fifths (39.6%) did not trust the authorities' assessment of the environmental impacts of mining. Among the reasons for the distrust was disappointment in the operation of authorities and politicians in controlling the Talvivaara mine: (...) "How far can we trust environmental authorities and politicians? Remember Talvivaara?" (R43). On the other hand, one source of concern was that in fear of losing an employer people ignore

potential problems: "The fear of losing jobs must not lead to negligent control. When properly managed, a mine employs a lot of people" (R100). Similar findings have been made for example in the Academy of Finland's programme *Mineral Resources and Material Substitution*, according to which nearly half of the Finns (45%) do not trust the authorities in charge of mining-related environmental impact assessment (Jartti et al. 2014). Distrust in the regulatory control of mining was also encountered in the 2016 survey (see Kuisma & Suopajärvi 2017).

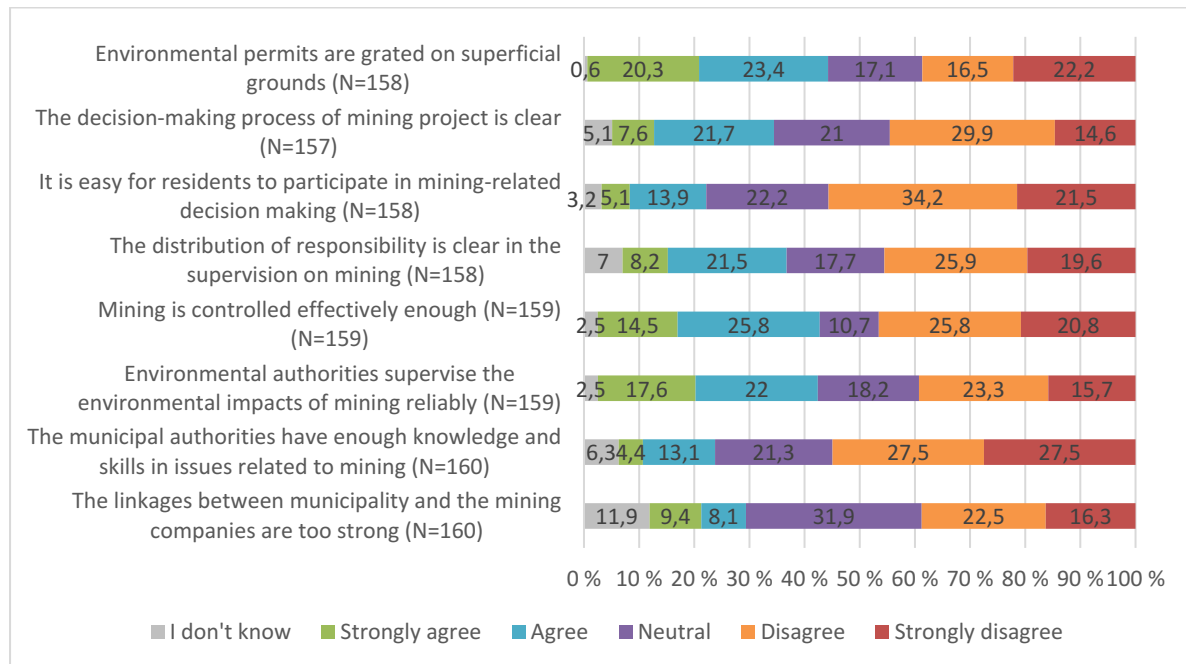


Figure 14 Regulatory control and decision making

Based on the material, a contradiction exists between the wide acceptance of mining and the opportunities to participate and influence: Although mining was considered acceptable by most (85%) of the respondents, more than half of them (55.7%) felt that it is difficult for the residents to participate in mining-related decision making. The figure above shows that the respondents have differing opinions about their influencing possibilities. Roughly a third (35.7%) were satisfied with their opportunities to influence. Almost a third (28.7%) could not state an opinion and more than a third (35.6%) felt that their participating and influencing possibilities in mining-related decision making are poor. Also the project-specific assessment shows that the local residents' participating and influencing possibilities should be increased. In fact, the lowest ratings of all three projects concerned participation and the effectiveness of participation (see Figure 15).

A comparison according to the place of residence shows that the opportunities to participate and influence are considered best in the areas near the mines. Participating and influencing possibilities were considered good in the mine villages by almost half (46.5%), in the municipal centre by almost a third (29.0%), and in the other villages by almost a third (30.0%) of the respondents (see Figure 8). The regional differences in the experienced influencing possibilities may be a sign of the companies' investment in interaction in the mine villages. Based on the follow-up survey, the residents of So-dankylä feel that their participation has not improved in two years (see Kuisma & Suopajärvi 2017).

During the survey of spring 2018, several projects were in progress in various phases and ore was actively explored in the municipality. Monitoring various projects and participating in decision making require an exceptional amount of time and resources from residents. Project permit processes and the division of responsibility between authorities and other stakeholders are also complex. Moreover, communication and participatory practices may vary between companies. One respondent notes, "Private persons, residents of the areas near the mines and mining projects, and entrepreneurs spend a lot of time on following the ongoing mining issues and on representation" (R96). To improve the influencing possibilities of the residents of a municipality with high mining potential, there should be clear and universal models of interaction that make it easier to monitor the processes. This could also enhance the residents' participation.

#### **4.4 Project-specific assessment**

The respondents were asked to assess the Kevitsa and Pahtavaara mines and the Sakatti mining project in terms of communication, participation, and influencing. The questions concerned the mines and projects, not the companies, because ownership of the Kevitsa and Pahtavaara mines has changed during their life cycles. The grading scale was that used in Finnish schools (4-10). A decision was made to use school grading because most if not all of the respondents are familiar with it. In addition, during the first survey the scale had proven easy to understand and use. In the future, it will be easy to follow the project-specific and overall acceptability of mining in the municipality using school grading.



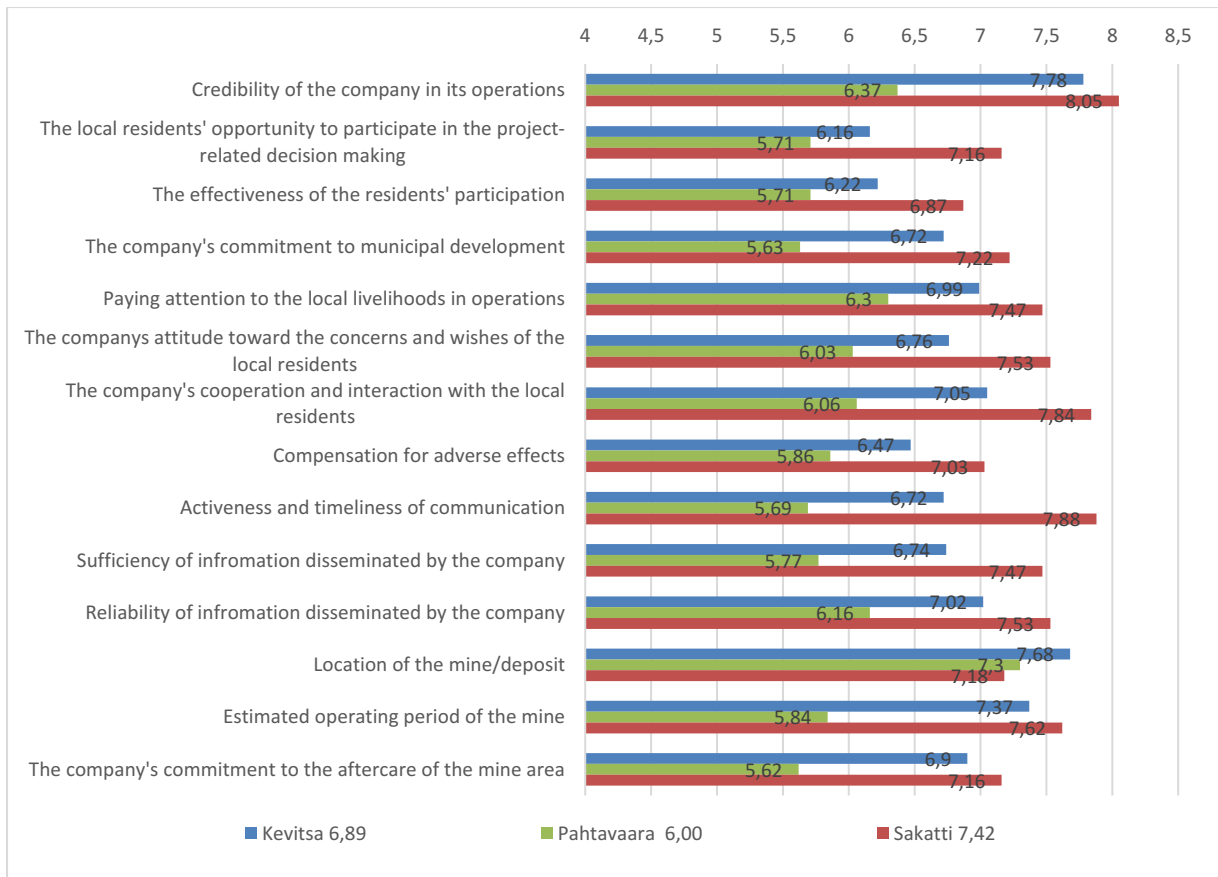


Figure 15 Project-specific assessment

The grades of the projects ranged between fair (5.5) and good (8). Compared with the 2016 survey, the total grade of each project went up: Kevitsa 7, Sakatti 7.5, and Pahtavaara 6. Sakatti improved its grade more than the others – almost by a whole integer (6.77 in 2016) (Kuisma & Suopajarvi 2017).

Pahtavaara’s total grade remained practically the same (5.96 in 2016). Pahtavaara was closed for a long time and its ownership changed, which also shows in its grades. Its grades were the poorest in all instances. The respondents were dissatisfied especially with the company's commitment to municipal development and the mine's aftercare: The grade in both instances was fair (6). The best grade it received was for its location (7).

Kevitsa also received almost the same grade as in the previous survey (6.84 in 2016). Its highest grade was for trustworthiness, which was deemed to be good (8). It was also assigned a good grade (7.5) for the estimated operating time, location of the deposit, communication, reliability of information, and the mine’s estimated operating time.

Of the three projects assessed, Sakatti was assigned the best total grade. It was assigned a good grade (8) for reliability, activeness of communication, timeliness of communication, cooperation, and interaction with the locals. The location of the deposit was also assigned a good grade (8), although in the open-ended answers the project’s location in a Natura 2000 zone divided opinions. There were those who were “totally against having mines in nature reserves or in their vicinity” (R102), whereas others did not recognise the conservation value of mires: “we have more mires than we need, so there’s no need to conserve them” (R28).

The survey indicates that each project had something to improve in terms of the participation and influencing possibilities of the local residents. Each project was assigned the lowest grades when the respondents were asked about their opportunity to participate in and influence project-related decision making. Kevitsa and Pahtavaara received a fair grade (6), while Sakatti's grade was satisfactory (7). The respondents were also expressly asked to assess the effectiveness of participation, but the grades did not differ from those concerning the opportunity to participate. Also in the 2016 survey the respondents were critical about their opportunity to participate and influence, assigning grades that ranged from adequate (5) to fair (6) (Suopajarvi & Kuisma 2017).

It should be noted that many respondents assigned one or several projects either the highest or the lowest possible grade in every instance. This may indicate an inclination to support one project or to express disappointment in another. For example, during the village rounds some people said they wanted to give Sakatti the highest grades in order to support the implementation of the project. Based on the survey, those who oppose the project have also expressed their opinion that way. It will be interesting to see how the project-specific assessments develop, especially if the Sakatti project goes forward or the Pahtavaara mine restarts operation.

## 5 Conclusion

The respondents to the follow-up survey are satisfied with Sodankylä as a place to live, and mining is generally considered to have a positive effect on the vitality and spirit of the municipality. Mining has brought new jobs and advanced the local economy. Most importantly, locals think that mining builds trust in the future and gives hope that the municipality will remain strong. The respondents also wanted to provide the companies with a good operating environment. Mining has improved the municipality's image, atmosphere, and attractiveness. However, some respondents felt that solidarity has suffered somewhat because mining has divided opinions among the residents.

Mining had benefitted trade substantially more than other livelihoods but the respondents were more dissatisfied with private services than in the previous survey. Respondents were disappointed by the fact that several businesses have closed down permanently regardless of the active mining operations in the area.

Demand for housing was still an urgent need to be met in the municipality. Especially in the mining villages, respondents have hoped that the municipality and mining companies would pay attention to the preconditions for workers to settle in the nearby neighborhoods of existing and planned mining areas. According to the respondents lack of housing, the service structure and the way in which the rotation of work shifts has been organised by the companies does not encourage people to move into the villages or the municipality.

According to the replies, mining has barely affected the municipality's supply of cultural and other events or the operation of associations providing free time activities. Studies conducted previously as part of the REGINA project have shown that both factors are important for experienced comfort of living and attractiveness (see Suopajarvi 2017; Saariniemi 2017; Kuisma 2016).

The mining industry is strongly male-dominated. According to the replies, both women and men were satisfied with their employment and career options in Sodankylä, but women considered their educational options worse than men. By ensuring open and safe workplace cultures for all genders and dismantling the practices that maintain gendered educational and occupational preferences, gender segregation could be mitigated in the municipality.

Based on the material, a contradiction exists between the wide acceptance of mining and the residents' inadequate opportunities to influence. It has been difficult to take part in project planning and decision-making, and the division of responsibilities between authorities is complex. Since the municipality also has many ongoing projects in their different phases, participation requires a great deal of time and resources from the residents. According to Hast and Jokinen (2016), the social sustainability of natural resource projects presupposes that residents and other stakeholders have a clear picture of a project's impacts and other related factors. It is therefore important to make sure that it is easy for the residents to follow the decision-making processes related to mining projects. The survey shows that there is a demand and, based on the wide acceptance of mining, favourable conditions in the municipality for developing models of interaction, which is also one of the objectives of the municipal mining programme (see Sodankylän kunta 2018).

Another contradiction relates to environmental impacts. Half of the respondents thought that mining has impaired the state of nature and the environment. The open-ended answers show that environmental damage, especially contamination of water, was considered the greatest threat related to mining. The environmental impacts of mining are multidimensional, and if they are realised, they also turn into social impacts. The respondents have experienced environmental impacts as reduced hunting and berry-picking grounds, as a concern over spoiled fishing waters, as changed landscapes, and as experienced decrease in traffic safety.

The benefits and adverse effects of mining are unevenly divided among the residents. The adverse effects fall on the mine villages and on reindeer herding as a livelihood. As for reindeer herding, economic loss is only part of the problem because it is also of a way of life, which means that money does not cover everything (R84).

In view of the social sustainability and acceptability of mining, it is important to ensure the participation and equality of the local residents, especially if there is a wish to see mining expand in the municipality.

## Acknowledgements

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