SusMinNor

Sustainable mining in the Northernmost Europe

– lessons learned and practices developed

SYNTHESIS REPORT

SUSTAINABLE MINING – NORDIC ADVANCED KNOWLEDGE SYNTHESIS GUIDEBOOK
GOOD PRACTISES AND KNOWLEDGE GAPS

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by:
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Executive summary

The SusMinNor project is a collaboration between the Regional Council of Lapland, the University of Lapland, and Luleå University of Technology and has two main objectives - to enhance cross-border cooperation around sustainable mining in the Interreg Nord area, and to consolidate and synthesize important research results within the field of social science, specifically the impacts and synergies between mining and society in the European North. The project is funded with financial support from Interreg Nord and runs from 2015-2016.

To date there has been one project workshop in Haparanda, Sweden (April 2016) for researchers, and the closing seminar is scheduled for September 21, 2016 in Rovaniemi, Finland. The Synthesis Report is the main deliverable of the project and highlights the major research themes in the social science literature on sustainable mining in Finland and Sweden, identifies good practices and knowledge gaps in the current research.

A brief review of the international initiatives related to sustainable mining has been done to offer a comparison with research topics receiving interest in Finland and Sweden. While the scale of research and its main application to developing countries is very different than the type of research needed in Finland and Sweden, there are sub-topics such as stakeholder engagement strategies and social sustainability that are common themes to the Nordic countries as well. Even given the differences, it is clear that many opportunities for synergistic learning exist.

There are five recurring themes found interwoven throughout the Finnish and Swedish literature.

- Industry self-regulation (including corporate social responsibility and social license)
- Social sustainability : reconciliation of livelihoods and community identity
- Social sustainability : socio-economic impacts and regional development perspectives
- Social sustainability : industry culture, health and well-being
- Legal frameworks and regulatory aspects

While these themes are common to the social science research in the two countries, their substantive approach is actually quite different. Hence the sub-themes tend to be somewhat different. For example, under the *Industry self-regulation* theme, Swedish research emphasizes the success of management systems in terms of stakeholder engagement strategies and the need to better systematize these strategies. Sweden also has more examples of one-industry towns and has done a good deal of research on the social after-effects once a company leaves and the mine is closed. In Finland, the approach to stakeholders is quite different in that a company's management and organizational structure is not analyzed. Rather, the focus is the other way around - community attitudes toward mining companies and a bottom-up approach to stakeholder engagement are the approaches that receive attention. The *Industry self-regulation* theme lends itself to this dichotomy where we see on one hand a more business-based approach from Sweden and on the other hand a more community participatory approach from Finland.

There are three social sustainability themes individually identified in this synthesis report and yet the specific topics under each rarely are seen in both the Finnish and Swedish literature. Under *reconciliation of livelihoods and community identity,* research in Finland mainly looks at the former and in Sweden the research focuses on the latter. *The socio-*

economic impacts and regional development perspectives theme is clearly dominated by Swedish researchers as there is very little attention paid in Finland to this topic. *Industry culture, health and well-being* again shows the differing research orientations, as in Finland it is the overall well-being of workers, both directly employed by the mining sector and those peripheral to the industry, that garners the most attention. The Swedish perspective centers on better understanding gender, identity and tradition within mining companies.

The last theme, *Legal frameworks and regulatory aspects*, is more dominated by Finnish researchers than Swedish ones. Again, the individual topics overlap infrequently. A legal outlook pervades the research in Finland; for example, topics of interest include mining legislation and reform, impact assessment and Sami rights. In Sweden, there is some legal analysis but the greater interest is more pragmatic as the research is more centered on better designing, and perhaps even more importantly, better implementing regulations.

With respect to good practices, one of the most notable differences between the two countries is that Finnish literature tends to provide specific examples whereas Swedish literature emphasizes positive approaches.

There are no easily identifiable common categories with which to order the knowledge gaps so a few examples are provided here instead. Looking at social acceptance, it is suggested that the different levels of acceptance be studied, the importance of mining history and its effect on SLO in Sweden be clarified, and more rigorous methodological approaches and the development of indicators be created to determine how mining companies obtain a social license to mine. In Finland,

reconciliation of livelihoods is mainly examined from the viewpoint of companies, but it is suggested that the roles of other actors should also be studied, i.e. affected municipalities and land use conflicts with the Sami are two major topics. In Sweden, there is a desire to research the links between activities within companies to the community. In the remaining themes, for socio-economic impacts, there is a need to identify how a community can benefit over the long-term, even after a mine is depleted and closed; well-being for both mine workers and other related knowledge workers is highlighted; and there are many recommendations in the regulatory theme ranging from better assessments of legislative reforms to increasing protections for the Sami.

If there is one consistent message throughout the literature, it is that the importance of understanding the role of communities in mining projects is growing, both for Finland and Sweden. Although mining is cyclical in nature, other changes occurring in the northern reaches of both countries seem to be on a rather linear trajectory upward – a warmer environment and more industry to name two of them. It is only a matter of time before interest grows again in mining activities in this region, and in the interest of ensuring truly sustainable development, tailoring the future research needs for both Finland and Sweden will be essential.

1. Introduction

1.1 PROJECT SUMMARY AND MAIN OBJECTIVES

The SusMinNor project is a collaboration between the Regional Council of Lapland, the University of Lapland, and Luleå University of Technology. The project's duration spans 2015-2016 and is funded with financial support from Interreg Nord. There have been two project workshops, one in Haparanda, Sweden in April 2016 for researchers engaged in the subject, and the closing seminar, during which the research results were disseminated, in Rovaniemi, Finland in September 2016. The Synthesis Report is the main deliverable of the project and highlights the major research themes in the social science literature on sustainable mining in Finland and Sweden (not Norway unfortunately as the project partner dropped out), and in addition, also identifies good practices and knowledge gaps in the current research.

There are two main objectives, which are to enhance cross-border cooperation around sustainable mining in the Interreg Nord area, and to consolidate and synthesize important research results within the field of social science, specifically the impacts and synergies between mining and society in the European North. In so doing, the SusMinNor project aims at improving the understanding of the inherent tensions between mining and society -- mining's contribution to local and regional economies, its potential to adversely impact communities and the environment, and the overall implications for sustainable development in the Interreg Nord area. Finally, analysis of the data will subsequently help define the future sustainable mining research agenda in the Nordic countries.

1.2 OVERVIEW OF SUSTAINABLE MINING RESEARCH IN FINLAND AND SWEDEN

In Finland there has recently been a substantial national initiative for responsible and sustainable mining which has largely grown out of the environmental degradation and social disruption caused by the Talvivaara mine. Sitra, the Finnish Innovation Fund, founded *The Network for Sustainable Mining* in May 2014 gathering together mining companies and different stakeholders nation-wide for developing the mining industry in Finland. Since the summer of 2015, the network has been working alongside the Finnish Mining Association and it is led by the permanent secretary of the Ministry of the Environment Hannele Pokka. With the Network having produced the first corporate social responsibility report of the Finnish mining industry (Kaivostoiminnan yhteiskuntavastuu 2014), as well as a toolkit for stakeholder co-operation at the local level, including several good examples and models for dialogue between mining companies and local communities (Työkalupakki: kaivostoiminta 2015), it has been one of the most active promoters of the newly emerging concepts in Finland of corporate social responsibility and proactive stakeholder engagement.

Sitra also gathers statistics about mining research in Finland. There have been over 140 mining related research and development projects since 2010, and as of July 2015, 50 are ongoing. Most of these are about developing production processes (26%), or about waste and side products (16%). The importance of studying social issues, and in particular reconciliation with other livelihoods, continues to grow as shown by the fact that social research rose to third place during the year, yet, even so, its total share of research and development projects reached only nine percent (Sitra 2015). Sitra suggested that in the earlier phase of evaluating mining projects, which occurred in June 2014, the most important research themes are local co-operation and reconciliation with

other livelihoods, development of impact assessment and environmental issues, water issues and communication (Sitra 2014).

Unlike in Finland where the research in sustainable mining focuses largely on the social impacts affecting local communities, in Sweden the social sciences research has until now primarily focused on the economic impacts of mining for regional economies. In part this has to do with the historical role of mining in Northern Sweden, which has always been an important one, especially in economic terms, and it remains so to this day. The exports of mineral products have not only generated income contributing to the nation's economic development, but also to the growth of a number of companies which are now global mining industry suppliers. The equipment manufacturers Atlas Copco and Sandvik are the most well-known companies, and the growth of these and other businesses have been an important part of Sweden's transition towards an advanced economy.

Analytical approach 2.

In this paper we present most of the mining-related research projects from 2000 onward which have a social and legal scientific orientation as well as a regional focus on either Finnish Lapland or Västerbotten and Norrbotten counties in Sweden. Information on the projects in Finland has been searched from Sitra's database and from the Internet. With respect to the projects in Sweden, previous and relatively recent research on the interaction between mining and society has been gathered from scientific databases such as ScienceDirect, Scopus etc. and other online resources including university websites in the Swedish Interreg-Nord area (Umeå University and Luleå University of Technology). The paper does not contain an exhaustive list of the social science research concerning mining in Lapland, Västerbotten or Norrbotten, but it gives a quite comprehensive overview of the themes and questions addressed in mainly EU-funded mining research in the northernmost counties of Finland and Sweden. The main topics of the research are presented in five categories, and in every category both good practice models and knowledge gaps arising from the studies are discussed.

A brief note on the definition of good practice and the criteria used to determine what constitutes a good practice is useful. For the purpose of this article, good practice is conceived of as a way of conducting mining activities in an ideal manner, which always exceeds the minimum level of what the law requires, in a situation where many options are possible. Regarding the criteria used, most good practices were already identified in the literature, and for those that were not, the authors used several different sources: their own judgement based on their knowledge of the field, information resulting from a workshop for the SusMinNor project in Haparanda from 11-12 April 2016, and from interviews that were conducted for other projects involving aspects of sustainable

mining such as Sumilcere (Sustainable Mining, Local Communities and Environmental Regulation in the Kolarctic Area) and the First-In Arctic EIA project (Testing Improvement Processes of Finnish Environmental Impact Assessments and the Modes for Application in Arctic Regions of Finland and Russia). The same approach was utilized for identifying the knowledge gaps that are at the end of this report. It is hoped that by identifying these gaps, future research needs in the field of sustainable mining can be more clearly defined, and hence pursued, for the northern-most regions of Finland and Sweden.

Lessons from international literature 3.

A review of the key initiatives presented in the international literature on sustainable mining has been conducted in order to provide a benchmark against which to measure the progress of the research within the Nordic countries as well as to help further clarify the research gaps. By providing an overview of the key sustainable mining topics that receive global interest and then comparing whether these issues are similar or not to those present in Finland and Sweden, it is hoped these can at the very least help inform the current debates now occurring in the Nordics. The initiatives include those sponsored by supra-national governmental organizations, national governments and the private sector. While much of the research centers on developing countries, and given the differences in such fundamentals as governance systems, environmental values, cultural beliefs and business ethics it might seem as if the applicability of this research to the Nordic countries is limited, the broad themes of the research are relevant to all sustainable mining activities whether they are in developing or developed countries. The comprehensiveness of the most significant initiatives also is of a scale that is difficult to achieve when research projects are limited to only one or two countries, so the level of detail and methodological robustness can contribute in this capacity as well to the future research agenda in Finland and Sweden, especially in terms of research design. Hence, while there are dramatic differences, there is also great potential for synergistic learning.

There are numerous international initiatives furthering the concept and practice of sustainable mining, many of which have been reviewed for the SusMinNor project. However, in the interest of keeping this synthesis report to a manageable length, only the broad research trends will be discussed as opposed to the individual initiatives themselves. Review of the international initiatives, most of which have occurred within the last

20 years, has proven interesting largely because they mirror phenomena such as economic globalization, population growth, and not least, the role of sustainable development in increasing the awareness of the important role local communities play in mineral extraction and development. While earlier research focused more on the private sector as the main actor in the mining sector, more recent initiatives make a much greater effort at bringing together all stakeholders to voice their opinions, give insights, and engage in ongoing discussions in order to decide on the objectives of whatever aspect of sustainable development they have chosen to focus on, setting standards, sharing best practices, promoting accountability, and/or improving the image of the sector (Hojem 2014).

In terms of the broad trends, as mentioned previously, most initiatives focus on developing countries and on strengthening institutions and transparency. Guided by the understanding that good governance is an essential ingredient for translating mineral wealth into economic and social development beneficial to communities, the initiatives that target public sector and public governance focus on reforms and policies that help maximize these benefits. Examples of these include the Extractive Industries Transparency Initiative (EITI) and the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF). The EITI, begun in 2003 and implemented by countries, is a disclosure standard used to promote transparency and accountability for the management of natural resources. In a similar vein, sponsored by South Africa and Canada, the IGF started in 2005 as an open forum to promote dialogue between member-country governments, mining companies and industry associations.

There are also numerous initiatives affecting corporate behavior

which are sponsored by supra-national organizations but that do not specifically target the mining sector. Even so, within the mining sector, some of these are the most well known of all sustainable development-oriented initiatives. These include the UN Global Compact and its Ten Principles, which cover human rights, labour, the environment and anti-corruption, the UN Guiding Principles on Business and Human Rights, and the OECD Guidelines for Multinational Enterprises. Although formulated for all types of businesses, a number of mining companies have agreed to abide by these principles and guidelines as well as to report on their success at actually implementing them (Hojem 2014).

Much of the research on sustainable mining that has been initiated by companies has been launched by a group of them interested in raising the profile of the industry (Hojem 2014). These initiatives tend to focus on proposing principles and policies for sustainable practice, management standards, accountability, reporting and assurance. The most well-known example is the Mining, Minerals and Sustainable Development (MMSD) project, which was started by nine of the world's largest mining companies who, as a result of the mining industry's reputation being under assault in the late 1990s, decided to examine the role of the minerals sector in contributing to sustainable development and how that contribution could be increased. Another well-known initiative is the International Council on Mining and Metals (ICMM) created in response to the MMSD project just mentioned. Today ICMM consists of 21 of the world's largest mining companies as well as 33 national and regional mining associations. (Hojem cited Dashwood 2007; 2013) As opposed to a group of companies or an industry association, research from individual companies tends to concentrate on developing models and tools to help the industry in managing socio-economic impacts. For example, the British mining company, Anglo American, not only has an approach to social performance detailed in the Anglo American Social Way (AASW)

but has developed an implementation mechanism for it entitled the Anglo American Socio-Economic Assessment Toolbox (SEAT).

3.1 RESEARCH GAPS IN THE INTERNATIONAL LITERATURE

While the field of sustainable mining is extremely broad, and by definition there are many areas still in need of research, several categories of gaps stand out very clearly:

- While there is a great deal of literature on the evolution, and often disintegration, of mining communities throughout the world, there is little research to date on the potential future of 'mining towns' in the Nordic countries.

- The need to understand the particular cultural context of a community in which mining activities take place is always mentioned in the social sciences research; however, there is no research that looks at the benefits of systematically compiling a history of affected communities.

- In many regions, the Nordic countries included, a community's relative acceptance of a mining project is, among other things, contingent on their trust of government. In this era of significant governmental reorganization, including the authorities responsible for regulating mining activities, research that looks at the affect on community relations in future projects would be helpful for all involved actors.

- Public perception and media attention are both crucial elements in determining the success or failure of mining projects. Little research, however, actually focuses on the role and impacts of both of these factors.

- With recovery technologies constantly improving yet at the same time their efficacy and safety remaining inadequately tested prior to utilization, research should focus not only on the technical side to ensure that untested materials will actually function the way they are supposed to, but also on the social side regarding the potential for communities to be adversely impacted.

- Fluctuating commodity prices and uncertain global markets constantly affect the demand for metals and minerals, but communities depend on the longevity of mining projects. There is a great deal of research on corporate social responsibility, yet it never addresses the responsibility a mining company has toward a community if it is in financial difficulties or goes bankrupt.

In Peter Hojem's excellent paper (2014), additional research gaps in the literature of sustainable mining have been identified and are worth noting here:

- Indicators in social science research literature are used for evaluating past performance but less for decision-making. Developing forward-looking indicators would likely be quite useful to ensure negative impacts do not occur rather than mitigating them afterward. This said, there is little data to prove that sustainability indicators and frameworks actually lead to better decision-making, or for that matter, what their actual impact is.

- A more ecosystem-based approach should be used to look at mining impacts on the affected communities.

- For most companies, sustainability reporting is done on a voluntary basis and there is little recourse for stakeholders in the case of misbehavior (Worrall et al. 2009). The enforcement dimension of sustainability reporting needs to be included into the mainstream of sustainable mining actions.

Sustainable mining research in northern Finland and Sweden

4.

This chapter presents a review of research on social or legal aspects of mining in the Interreg-Nord area, i.e. Finnish Lapland and the Swedish counties of Norrbotten and Västerbotten. The review focuses mainly on research published after the year 2000. We show that there is an extensive body of literature which addresses a range of different sustainability aspects. The literature review reflects a growing academic interest in research questions related to sustainable mining, as the majority of the studies included in the review have been published between the years 2014 and 2016. The chapter contains several sub-sections which reflect the major research themes that have been addressed. These themes are first introduced in section 4.1, followed by the literature review.

4.1 MAJOR RESEARCH THEMES

There are five recurring themes found interwoven throughout the Finnish and Swedish literature: (i) *industry self-regulation*, which includes research on issues such as the changing social role of dominant companies in former single-industry towns, corporate social responsibility (CSR), how the social license to operate (SLO) can be achieved and how the concept of SLO can be understood ; (ii) *social sustainability* in terms of the *reconciliation of livelihoods and community identity*, where research for example has addressed how mining and nature-based livelihoods can co-exist and how local communities experience the social impacts of mining ; (iii) *social sustainability* in terms of *socio-economic impacts and regional development perspectives*, including research on mining's contribution of jobs and income to local

and regional economies and the implications of restructuring processes and the development of mining clusters ; (iv) *social sustainability* in terms of *industry culture, health and well-being*, including research on gender aspects, health and work conditions in mining, and finally ; (v) *legal frameworks and regulatory aspects*, including research on mining legislation, environmental regulations and competitiveness, as well as on related procedures such as Environmental and Social Impact Assessement, and research on Sami rights.

In the remaining sections of chapter 4, we present the literature review organized according to the five major themes described above. The five major research themes can be summarized as follows :

- Industry self-regulation (including corporate social responsibility and social license)
- Social sustainability : reconciliation of livelihoods and community identity
- Social sustainability : socio-economic impacts and regional development perspectives
- Social sustainability : industry culture, health and well-being
  Legal frameworks and regulatory aspects

4.2 INDUSTRY SELF-REGULATION

Table 1 provides an overview of studies on this theme. Under the heading “major sub-themes”, we attempt to briefly summarize the main topic addressed by each study.

Table 1. Research on mining industry self-regulation

MAJOR SUB-THEMES	FINLAND (Authors)	SWEDEN (Authors)
1. Responsible mining and CSR in Europe and Russia	—	Adey et al.2011
2. Changing social role of dominant companies in single-industry resource towns (Swedish welfare state)	—	Knobblock 2013
3. Evaluating established management systems (for Boliden) in terms of stakeholder management	—	Ranängen and Zobel 2014
4. SLO as risk management tool in the mining industry in the Northern parts of Finland, Sweden and Russia	Nysten-Haarala et al. 2014	—
5. Environmental legislation vs local expectations as norms that guide and control companies	Kokko et al 2014	—
6. Social license as a concept that relates to social acceptance and local expectations towards mining	Jartti et al. 2013	—
7. Relevance of SLO as a term and concept in the Scandinavian countries and Russia	Koivurova et al. 2015	—
8. Obtaining and maintaining SLO for established vs. new mining companies in North Sweden	Koivurova et al. 2015	Tarras-Wahlberg 2014
9. Affect of the local socio-economic context on how plans for a new mine may be received	Koivurova et al. 2015	Jakobsson 2008
10. How mining and exploration companies in Sweden gain SLO	—	Tarras-Wahlberg 2014
11. Importance of understanding local circumstances and achieving good dialogue with community stakeholders for gaining SLO in Sweden	Nysten-Haarala et al. 2014	—
12.Interaction between mining companies and communities based on eight case in the European North	Koivurova et al. 2015	—
13. Participatory elements in Swedish mine development i.e assumption of responsibilities by state or new actors	—	Poelzer 2015

4.2.1 CORPORATE SOCIAL RESPONSIBILITY

The concept of corporate social responsibility (CSR) is often defined as the integration of social and environmental concerns in a company's operations and in its interactions with stakeholders on a voluntary basis (Ranängen and Zobel 2014). It is commonly accepted that extractive industries are at the cutting edge when it comes to practicing CSR hence reinforcing its importance to the mining sector.

CSR-related aspects have been examined through two different approaches in Sweden, where one views CSR through a management lens and considers its implementation in detail, while the other direction of research has instead approached CSR in a wide sense as the relationship between mining companies and society.

***Ranängen and Zobel* (2014)** study whether the adoption of established management systems is useful for realizing stakeholder management through an in-depth case study of the Swedish mining and metals company Boliden. The study indicates that certified management systems are beneficial tools for CSR and can be used effectively as a means of stakeholder management, especially within the areas of the environment and labour. However, other important CSR issues, such as fair operating practices and community involvement and development, fall outside the scope of the adopted management system.

Another empirical addition by Ranängen (2015b), describes how the same company, Boliden, reacts to and adopts stakeholder management theory where the focus is on the practical rather than theoretical implications. The paper provides practitioners with a stakeholder management theory that can be purposefully applied using a management system

approach and offers a way of working that categorizes, systematizes and makes stakeholder management more effective. The case study is based on interactive workshops and shows how during the planning phase of the PDCA (Plan, Do, Check, Act) methodology, the identification of stakes and the development of effective strategies to best communicate with stakeholders can be performed. The stakes and strategies thus constitute the primary base on which a sustainability management system is built. The study further shows how these stakes and strategies can be translated into objectives, targets, programmes, procedures and practises for the implementation of CSR in on-going everyday activities.

***Adey et al.* (2011)** conducted five case studies on responsible mining and CSR in Europe and Russia. One of the case studies was Kristineberg in Västerbotten County, Sweden. The case study in Kristineberg comprised interviews with a wide range of stakeholders including mining company employees in various roles, as well as surveys distributed to the public, of which 66 were completed. Kristineberg was established adjacent to Boliden's mine and was once a prospering community, but in more recent years employment in mining has declined, not least due to the closure of a processing plant. This has caused the local economy to contract: people have moved, shops have closed and property values have declined, causing several families to move entire houses rather than selling them. Adey et al. further observe a number of environmental issues in the area, presumably caused by past mining. In the survey that was distributed to the local community, questions were asked regarding the respondents views on mining, the level of community engagement by the mining company and other aspects of the mining company's social performance. Nearly 70 % of the respondents expressed a positive view of mining in general and 95 % thought that mining was an important part of their heritage. Only 18 % felt that the local community was sufficiently engaged by the local mining company and government (i.e they answered "yes" to

the particular question), while 40 % said “no” and nearly 40 % answered “I don’t know”. Furthermore, 18.5 % of the respondents thought that the mining company was improving in meeting public expectations, while 15 % felt that their performance was deteriorating. Adey et al. also performed interviews with various stakeholders. The Sami community in Malå near the mine expressed a positive view on their current dialogue and relationship with the mining company, but stated that this had not always been the case in the past. The Sami community in this particular area appeared to be more concerned with (and impacted by) changes in forestry practices and wind energy development in the area, while they felt that mining was more tightly regulated and controlled. Other local stakeholders were asked about their views on the mining company’s responsibility for the declining social development in Kristineberg, and the responses reveal a mixed range of opinions. While some argued that the company should contribute more to social development, many people stated that they did not hold Boliden responsible for the decline of the community, as expressed by one respondent and former employee of the mining company: “I do not think that you can blame someone in particular for people moving, because that is just how it is”. Based on a comparative analysis of all five case studies, Adey et.al. find that mining companies basic responsibilities can be summarized as follows:

- Early engagement with the community using appropriate methods of consultation
- Respect the community
- Honesty and openness about the anticipated social and environmental impacts of the project

- Listen to the view of stakeholders and respond to their concerns
- Ensure CSR extends beyond the time-frame of the anticipated mining project to be purposeful and add value. CSR is not about buying the support of local people.
- CSR initiatives need to help educate people within the community to select the long-term gains rather than short-term offerings.

Adey et al. concludes that the expectations of mining communities vary substantially and they are affected by past experiences with mining and other industries. They argue that communities must be consulted at the earliest possible stage of any potential development, to enable assessments of community expectations and goals, and to allow a company to consider how best to work with a community including how to balance their expectations.

***Knobblock* (2013)** examines the changing social role of dominant companies in single-industry resource towns, in the context of the Swedish welfare state. She based her study on three qualitative case studies from Västerbotten County, comprising two single-industry mining towns that were established by the same mining company in the 1920s and 1930s, and one community where a mine was only at the planning stage, set to be developed by a foreign mining company. The case studies are based on interviews with mining company representatives and local government officials, supplemented by desk studies of annual reports etc. Knobblock notes that several tenets of CSR are already integrated in Swedish law (e.g. human rights, occupational health and safety, pollution control etc.) and therefore argues that such initiatives are not part of CSR in the context of Swedish mining. CSR is thus viewed as strictly voluntary measures. One finding is that voluntary actions to mitigate negative economic, social or environmental impacts, as well as improving living conditions in the communities, were referred to as CSR by the mining

companies. Knobblock also found that companies used CSR to describe legal requirements, which she objects to. One way in which the companies implemented CSR was by committing to adhering to various standards and by formalizing their own codes of conduct. Both companies in the study also emphasized taking local economic responsibility by hiring local workers and by contracting local suppliers. They aimed at achieving a greater share of women in their staff than what is typically the case in mining, but despite efforts to recruit, few women were actually applying for jobs at Boliden (which was the only operating mining company in the study). The affected municipalities had an overall positive attitude towards mining, expect for the community where there were only plans for a mine, where the local government acknowledged the complexity of balancing economic development against other land uses and interests. Knobblock found that the municipalities had limited knowledge about CSR and how to work together with the mining companies. Her interviews indicated that few of the mining companies CSR-statements reached down to the municipal level and she argues that mining companies should "do more". In the Swedish context, municipalities have little formal influence on decisions involved in mining investments (i.e. permits etc.), leaving local concerns either in the hands of state authorities or up to voluntary compliance by the mining companies. Finally, she addresses some of the challenges in securing a positive long term development in mining communities, given the booms and busts associated with the industry, and argues that one option could be to consider a similar tax scheme as the Australian "Mineral Resource Rent Tax" which could aid mining communities in addressing the structural problems they face.

CSR needs to be implemented at every level of an organization if it

is to have any meaningful impact. Established management systems are claimed to be useful for CSR practice and frameworks are based on various standards. The benefits of integrating all the aspects of CSR into one sustainability management system are often highlighted (Ranängen, 2015a).

4.2.2 SOCIAL LICENSE TO OPERATE

In both Finland and Sweden's mining sector, there is a growing body of social science-oriented academic literature on the 'social license to operate' (SLO) concept. Researchers have identified key objectives for social licensing and community acceptance at the local, national and global levels. According to Kokko et al. (2014), social license builds on the concepts of acceptance, reliability, and the trust of stakeholders created by actual activities in the field.

Nysten-Haarala et al. (2014) look at the SLO as a risk management tool by studying how self-regulation operates in the mining industry in the northern parts of Finland, Sweden and Russia (aka the Kolarctic) through a case study approach evaluating two companies in each country.[1] The study shows that adjustment to local circumstances is emphasized in the mining sector of the Kolarctic area as the means to gain a social license to operate. Nysten-Haarala et al. (2014) argue that often a company's emphasis on global regulation can be depicted as superficial or imposed from outside. Still, according to the study, global standards can offer good guidance and tools for self-regulation for international companies operating all over the world. Kokko et al. (2014) note that the norms that guide and control companies are essentially based on environmental legislation but usually local expectations drive companies to go further.

1 The case studies comprised interviews with mining company representatives, NGOs and local stakeholders, and reviews of company webpages and annual reports.

In addition to interacting with the local community in a business context, a company is also expected to arrange possibilities for participation and cooperation. Trust is built and strengthened through this type of social cohesion and teamwork.

***Jartti et al.* (2013)** examined social license as a concept that relates to social acceptance and local expectations towards mining. Their survey-based study was made in four different counties in Finland, including Lapland. Jartti et al. (2013) argue that there are different levels in social acceptance which range from complete acceptance to total unacceptance. Their study focuses on what they call 'preliminary acceptance' which includes attitudes and expectations towards mining in the local and spatial context. Preliminary acceptance constitutes the terms and boundaries for singular social licenses. The term 'singular licenses' in this case means an individual social license is issued for a specific project and does not refer to the concept of social license to operate in general. According to their research, when studying the terms and boundaries of social licensing, it is important to take into account different facts that are significant to the local area. Some of these include an area's economic structure and demographics, cultural history, history of manufacturing and industry, local history of mining, and different geological and geographical characteristics, all of which set the baseline for situational social licensing.

As part of the project *Sustainable Mining, Local Communities and Environmental Regulation in the Kolarctic Area* (Sumilcere), ***Koivurova et al. 2015*** argues that the term 'social license to operate' is not used widely either in the Scandinavian countries or in Russia. Despite this fact, the research team argues that SLO provides an informal path for

communities to have their voices heard if formalized opportunities are not used. The comparison also notes that many factors other than company performance are influencing how SLO is gained or not, e.g. political, national legal frameworks, etc.

In the on-going BuSK-project *(Building Shared Knowledge Capital to support natural resource governance in the northern periphery)*, social license to operate is studied in relation to mining and local communities. This Northern Periphery and Arctic programme project, lead by the Natural Resources Institute in Finland and started in June 2016, uses participatory GIS as a tool to collect land-use preferences of different local and user groups, and aims to pass these perspectives into decision making.

Unlike the Finnish research themes, which center on community attitudes toward mining and the different levels of SLO, the research themes in the Swedish literature are more focused on the importance of the historical mining context and the link between economic effects and SLO. Like Finland, in Sweden, new influences and practices were introduced by foreign mining companies, who commissioned impact studies not only on the environmental aspects of their plans as required by the permitting procedure, but also with respect to the social and economic effects on adjacent communities, which are not explicitly required as part of the permit procedure in Sweden. Undertaking these largely voluntary measures may reflect efforts to fulfill requirements by international investors, as well as fulfill a strategy to gain approval and acceptance from the community.

One lesson from the Swedish studies is that past experiences with mining matter a lot. Local people in mining communities, or communities that have a history of mining, tend to be more positive towards mining than people in “non-mining” communities where new mines are being planned. This somewhat mundane and by no means unique finding

points to both the role of mining's local economic importance and to the local understanding of mining in "social licensing". Communities that depend on mining know it and tend to accept some of the negative impacts, but communities that are new to mining seem to be more apprehensive. North Sweden has several communities with long histories of mining. In addition, ***Koivurova et al.*** **(2015)** found that "foreign companies may have to work harder [compared to Sweden's relatively old domestic companies] to be perceived as legitimate in Sweden". ***Tarras-Wahlberg*** **(2014)** also found that "newcomers" in Swedish mining have taken more ambitious approaches and performed more comprehensive EIAs and stakeholder consultation processes compared to "old and established firms", but they still tended to face more resistance than old and established firms.

The local socio-economic context may also have important implications for how plans for a new mine may be received. The results from ***Jakobsson***'s **(2008)** survey in Pajala, when Northland Resources' Kaunisvaara mine was in the planning stage, pointed to massive support for the planned mine and he concludes that it was seen by locals as perhaps the only chance to have a positive social and economic development in the area. Pajala had no mining activity before and the community had experienced a declining development for decades, which he characterizes as a state of "slow death". It should be noted that the mine in Pajala is currently closed due to bankruptcy. Following the terminology suggested by ***Tarras-Wahlberg*** **(2014)**, Northland was a foreign newcomer and thus among the group of mining companies that tended to face more resistance in Sweden. Jakobsson's (2008) results showed that the community was strongly positive toward the plans for a mine and that the level of support was interlinked with socio-economic

trends and expectations. In a relatively recent study by Koivurova et al. (2015), the authors draw on qualitative interviews conducted while the Kaunisvaara mine was operating and they conclude that Northland still enjoyed the approval of the affected community.

***Tarras-Wahlberg* (2014)** investigated what mining and exploration companies in Sweden do to gain a social license to operate (SLO). He delimited his analysis to studying some of the choices made by mining companies when they applied for a mining concession, focusing on all exploitation concessions that were valid on January 1, 2012. The empirical data thus comprises 146 exploitation concessions and 13 operating mines. Tarras-Wahlberg reviewed the applications to determine to what extent companies had made special efforts to establish community and stakeholder support, such as consultation beyond what was required by law. Importantly, more than half of the valid mining concessions were granted according to the old Swedish mining law, which has since been revised and now requires a more ambitious EIA than what was the case in the past. He finds that most of these concessions were applied for in December 1998 when a transitory arrangement was in place which allowed for a more modest EIA. The majority of these were made by old and established mining firms in Sweden (LKAB, Boliden, Zinkgruvan). Tarras-Wahlberg argues that the old and established mining companies have: "…not led the way in producing more ambitious EIAs or initiating wider stakeholder consultation processes", but he also emphasizes that their practices may be changing, as recent efforts have included more ambitious stakeholder dialogue. His review shows that companies that can be characterized as "newcomers" in Swedish mining have taken more ambitious approaches and performed more comprehensive EIAs and stakeholder consultation processes. He suggests several potentially contributing reasons including requirements by financing institutions, influence by international practices, the need to gain an SLO, and increasing

resistance from Swedish Sami communities and other organizations towards mining. Interestingly, he notes that most of the projects that face such resistance have been proposed by these newcomers, while very few of the projects proposed by old and established firms had faced resistance. Out of the mining concessions that were granted after January 1, 1999 and thus had to include a full EIA, a total of 17 had been appealed - 13 of these applications came from newcomers whereas only three of the total 104 concessions held by old and established firms faced appeals. Tarras-Wahlberg argues that further research is needed to explain why newcomers do not appear to be welcomed. He does go on to propose some possible reasons, including that established firms may over time have achieved social and community acceptance while newcomers have not had the time to build trust. An interesting possibility he raises is also that the approach to stakeholder dialogue that is chosen by newcomers tends to be: "...closely related to Anglo-American and neo-liberal ideas of CSR" and may not be appropriate in the context of a Nordic welfare state.

As mentioned previously in the Finnish context, the study by ***Nysten-Haarala et al.*** **(2014)** also contains two case studies from Sweden, where the mining companies (LKAB and the now bankrupt Northland Resources) emphasize the importance of understanding local circumstances and achieving good dialogue with community stakeholders. Both companies altered the traditional use of land in their mining areas, but the study suggests that they also established ongoing efforts to cooperate with Sami reindeer herders impacted by their operations. At least one of the companies (LKAB) voluntarily reached an agreement with an affected reindeer herding community. Although international standards such as ISO 14001 (on environmental management) were referenced or

even adopted by the companies (in the case of LKAB), their importance in the Swedish context appears to be toned down due to the country's advanced legislation; nevertheless, at least Northland had to comply with international standards to raise capital from international investors. Nysten-Haarala et al. characterize the role of self-regulation in Swedish mining as complementing the existing national legislation, rather than substituting it. The authors argue that: "...even though the companies would like to choose focusing on local circumstances, there are global drivers, which make other choices for them". And furthermore that "In companies which in reality focus on local circumstances the role of global regulation can be depicted as superficial or imposed from outside". Nysten-Haarala et al. conclude that good national legislation is the best starting point, but self-regulation can facilitate the implementation of sustainable mining practices.

***Koivurova et al.* (2015)** examined the interaction between mining companies and communities based on eight case studies in the European North. The Swedish case studies include mining projects in Svappavaara (in Kiruna municipality), developed by the state owned company LKAB, and a new mine in Pajala that had recently been brought into production by Northland Resources. Northland later went bankrupt and the mine closed, which is not explicitly addressed in the paper by Koivurova et al. as the research was conducted when the mine was still operating. Based on a review of previous research on the SLO concept, Koivurova et al. propose an analytical framework which combines company and community dimensions of SLO. Specifically, the framework comprises three normative criteria (legitimacy, credibility and trust) for evaluating company actions, and four levels of community acceptance, which embody the community's attitude toward a company. Ranging from low to high acceptance, the four levels are: withdrawal (of SLO), approval, acceptance, and identification with the project. Data for the individual case

studies were collected through semi-structured interviews with mining company representatives and stakeholders from the local communities, supplemented with a review of relevant company documents that were made available to the general public. While Koivurova et al. acknowledged that the case-study approach had limitations, they applied their analytical framework to evaluate what level of SLO each mining project had attained. The Swedish case-study indicated that both mining companies went beyond legal requirements to maintain and develop good community relations. The companies emphasized providing information and maintaining dialogue with local stakeholders as the most important aspects of their community relations. Notably, both companies had established some form of local information office in the affected communities. LKAB's long history in the region and the status of Kiruna as a traditional mining town was also noted. Citing interviews with local stakeholders, Koivurova et al. found that "foreign companies may have to work harder to be perceived as legitimate in Sweden", as respondents tended to be more positive towards LKAB than foreign mining and exploration companies. Despite Northland's international ownership, the company seemed to have achieved legitimacy with local stakeholders according to the study. Koivurova et al. found that LKAB and Northland paid considerable attention to their local community relations and appeared to act on concerns, when feasible. Based on their interviews with local people, the authors tentatively estimated that both LKAB and Northland enjoyed the approval of the affected communities. Overall, Koivurova et al. found that 'social license' was not a widely used term in the case-study countries, except for Finland where it was "explicitly used and continuously implemented". The authors argue that SLO in

some ways has become synonymous with CSR, but their interviews point to distinct differences between the two concepts. While CSR standards are derived internally from the company itself, SLO is 'given' from the community to the company. Although voluntary, a company's desire to receive SLO can thus empower the affected community, beyond what regulatory frameworks dictate.

***Poelzer* (2015)** examines participatory elements in Swedish mine development. He looked at two cases - Pajala and Kiruna, and examined where and when the state held influence over participation or if new actors had assumed these responsibilities. The study is based on a review of relevant legislation and semi-structured interviews with local stakeholders and mining company representatives from Northland (in Pajala) and LKAB (in Kiruna). Poelzer found that it was relatively straightforward to interpret where opportunities for participation arise according to the legislation, but in practice, interviews suggested that concerns and questions could be raised "...at any time, not just during the consultations in compliance with the EIA and Environmental Code". He argues that participatory practices have transitioned from organized, structured consultations towards companies fostering a relationship with stakeholders, and in addition, that more opportunities for participation in the process may lead to better outcomes for all parties. Regarding the extent of non-legislated consultations and agreements, Poelzer found that although a strong legal framework dictated consultations as part of EIA "...the most frequently referenced interaction occurs almost entirely outside of it". The respondents did not point to EIA consultations as critical junctures for influencing the development of the mining projects. Instead, the study suggests that local stakeholders in these two cases were engaged in dialogue by the mining companies early in the processes and thus able to provide input at any time and through informal means. Poelzer concludes that his findings: "...raise additional

questions regarding where state influence begins and end". While the state still holds the responsibility to balance important interests, other actors manage the day-to-day 'participatory' activities and people living in affected communities appear to demand (and in these two case, were given) input and influence beyond what legislation stipulates.

4.3 SOCIAL SUSTAINABILITY: RECONCILIATION OF LIVELIHOODS AND COMMUNITY IDENTITY

Table 2 provides an overview of studies which address this theme. Under the heading "major sub-themes", we attempt to briefly summarize the main topic addressed by each study.

Suopajärvi et al. **(2015)** examined social sustainability in northern mining communities. The study is based on 85 semi-structured thematic interviews conducted in late 2013 and early 2014, in mining communities in the European North (Norway, Sweden, Finland) and Northwest Russia. Suopajärvi et al. consider two dimensions of social sustainability: (a) procedural, which refers to political participation, participatory processes, equity, justice, inclusion, access and sense of community ownership, and (b) contextual, which refers to positive conditions within communities such as social coherence, creation of social capital, preservation of socio-cultural characteristics and quality of life. The authors identified four basic social sustainability themes that emerged from the case studies:

I ***Preservation of the Northern nature and a clean and healthy environment***. This theme includes concerns for human health as well as everyday life in the region, which often includes nature-based

Table 2. Research on reconciliation of livelihoods and community identity

MAJOR SUB-THEMES	FINLAND (Authors)	SWEDEN (Authors)
1. Social sustainability (procedure and context) in northern mining communities	Suopajärvi et al. 2016	—
2. Reconciliation of mining and other nature based livelihoods (reindeer herding and nature-based tourism	Kokko et al. 2014	—
3. Reconciliation of mining and tourism	Jokinen 2015	—
4. Threat of extractive industrial developments to the traditional livelihoods of the Sami indigenous peoples	Koivurova et al. 2015	Nygaard 2016
5.Community identity: resident's preferences concerning the present situation and future expectations in Pajala		Jakobsson 2008
6. Perceptions of the ongoing urban transformation caused by mining and the imapact on the communities of Gällivare and Kiruna		Jakobsson and Segerstedt 2014
7. Demographic processes in the context of an urban transformation (Kiruna)		Nilsson 2010 Sjöholm 2016
8. Socially sustainable development in the mining industry and the communities surrounding the mines		Abrahamsson et al. 2015

practices such as hunting, fishing, foraging and not least, reindeer herding. A reindeer herder from Pajala in Sweden said: "*We have experienced the forestry era, now the mining era is here and we have to deal with that. When the mining era ends, we will still hopefully be here*".

II ***Information and understanding***. Local people need knowledge and understanding regarding environmental changes. Despite efforts from mining companies to disseminate information at meetings and through other channels, respondents often stressed that environmental monitoring should be more open and some were even suspicious towards information provided by mining companies.

III ***Influence on process***. Local stakeholder need to be heard and want to be able to influence decisions related to mining projects. Suopajärvi et al. found that a sense of powerlessness existed mainly in Kolari, Finland and in Russia. Presumably, this issue was not as evident in Sweden or Norway.

IV ***Local benefits***. Finally, the study identifies the need to derive local benefit from the mine as crucial to social sustainability. This theme includes concerns such as the use of non-local labor, and the decreasing role of mining companies as "town building" compared to past experiences. In Sweden, these issues were clearly connected to housing shortages in mining towns. In Pajala, uncertainty about the economic viability of the new mine meant that few private actors had been willing to risk investing in housing, and there was a significant gap between demand for housing and the construction of new units at the time of the interviews. It should be noted that the mine in Pajala later went bankrupt and has remained closed since late 2014 and until this review is written.

Based on their findings, Suopajärvi et al. argue that procedural social sustainability is: "felt if there is continuous open and reliable information of environmental monitoring reported to the local community. And, the mining company is acting transparently and in dialogue with different interest groups so that their concerns are identified and met". From the perspective of contextual social sustainability, mining was generally seen as compatible with social sustainability in the case study regions, although regions with established nature-based industries questioned this vision. Suopajärvi et al. find that mines were seen as: "... promoters of social sustainability in Northern communities, providing employment opportunities, in-migration, prosperity, better services and infrastructure". Even so, Suopajärvi et al. find that in instances where mines were not "on solid economic ground", the uncertainty it created was experienced especially at the local level, causing difficulties in planning for households as well as local governments. Overall, the study underscores the interconnectivity of environmental, economic and social sustainability in the North.

Social sustainability is addressed more concretely by the **Posio municipality** who carried out a research project focusing on the Mustavaara mining project, which was in the planning phase at the time of the research (2013-2015). The aim of the research project was to inform the local people about the mining project, map out the local services, and to evaluate the possible demands for new services on the public and private sector in the Posio municipality should the Mustavaara mining project proceed to the construction and operations phases. According to the report, the pressure would likely be on housing, and in particular, the need for rental apartments would be burgeoning. There would also be a growing demand for services such as children's day care centers and schools, occupational health care, sport and leisure time activities, as well as an increase in construction licensing. It is noted in the report that

according to the experiences in other municipalities, the need for social services might slightly increase due the development of the new field of industry. (Posion Kehitysyhtiö Oy 2015.)

A more historical perspective in sustainability is addressed in a project entitled *Understanding the Cultural impacts and issues of Lapland mining: A long-term perspective on sustainable mining policies in the North*. The project, funded by the Finnish Academy and lead by the University of Oulu, analyses the emergence and development of Lapland mining in conjunction with a series of wider reforms imposed in northern regions since the early-modern period. This ongoing project seeks to understand the historical foundations of the current issues that surround Lapland mining and the complex cultural impacts of mining in a long-term perspective.

Under the general title of social sustainability can also be included reconciliation of different livelihoods. There is a growing body of literature and number of research projects in Finland on reconciliation of mining and other nature based livelihoods such as reindeer herding and nature-based tourism. In the project entitled *Different Land Use Activities and Local Communities in Mining,*[1] one of the main objectives is the reconciliation of naooture based livelihoods with practices of land use planning. The particular focus is on the opinions of local people, leisure time real estate owners, tourists, reindeer herders and other relevant stakeholders concerning reconciliation. According to ***Kokko et al.* (2014)** the first step toward reconciliation and social sustainability is to identify the nature users of the mining area and make sure there is

1 http://www.ulapland.fi/Suomeksi/Yksikot/Oikeustieteiden-tiedekunta/Tutkimus-ja-jatko-opinnot/Projekteja/DILACOMI/Tutkimustuloksia-ja-tiedotteita.

enough information available to all stakeholders.

Recently more research has specifically focused on the reconciliation of mining and tourism. ***Jokinen* (2015)**, for example, states that when the interests of the mining industry and tourism collide, the key questions in terms of the sustainable use of natural resources are: can these livelihoods exist side by side in the same area, what possibilities and tools are there for reconciliation and can these livelihoods benefit each other and how? A survey carried out by the Natural Resources Institute shows that tourism entrepreneurs in Lapland believe that mining projects have negative impacts on the tourism business because they tend to adversely affect the area's image as a nature destination (Jokinen 2015).

In Finland, there are other projects that are currently looking at tools to help reconcile competing land uses but there have been no published results yet. One project which started in February 2016 entitled *Governing adaptive change towards sustainable economy in the Arctic*, has as its main objectives the reconciliation of diverse livelihoods and an integrated assessment of both the economic and social values of alternative land uses. (***University of Lapland* 2015**)

Reconciling livelihoods is an issue also in an on-going project focusing on regions with large-scale industries that started October 2015 and is entitled *Regional innovation in the Nordic Arctic and Scotland* (REGINA). One theme of the project is to look at the social impacts of mining and then maximize the benefits and minimize the vulnerabilities caused by mining developments. The project is funded by the Northern Periphery and Arctic -program and it is lead by Nordregio. Finnish partners include Sodankylä municipality and the University of Lapland; from Northern Sweden, the partner is Storuman municipality in Västerbotten.

In addition to the literature above on reconciling livelihoods applicable to local communities in general, there is also a good amount of literature focusing exclusively on the Sami peoples, who are particularly vulnerable

to the effects of mining projects since much of the remaining natural resources in Finland and Sweden is situated in territories traditionally used by indigenous peoples (Anaya 2013). In the North, together with several other environmental problems such as climate change, extractive industrial developments pose a real threat to the traditional livelihoods of the Sami indigenous peoples (***Koivurova et al.* 2015**). Traditionally, the Sami have pursued a variety of nature-based livelihoods, such as fishing, trapping, small-scale family forestry, agriculture, gathering of wild berries and other natural products, together with handicraft-like manufacture of traditional articles. However, the most common means of their livelihood has been semi-nomadic reindeer herding.[1] This is also the livelihood that is generally the most affected by extractive industrial activities (Koivurova et al 2015). Although the role of reindeer herding as an economic source of income has decreased (***Nygaard* 2016**), this livelihood has still remained a unique economic and cultural emblem for the Sami people (Koivurova et al 2015). Today, one of the major threats to the reindeer herding industry is the gradually increasing mining boom.

Turning to the Swedish literature and the different areas of community identity that have been researched, we first look at ***Jakobsson* (2008)**, who conducted a survey on resident's preferences concerning the present situation as well as future expectations in Pajala[2], when the Kaunisvaara mine was only in the planning stage. The survey had 623 respondents, out of a representative sample of 923 local people between the ages of

1 The right to reindeer herding is reserved exclusively for Sami people in both Norway and Sweden.
2 The study also included Kolari in Finland, where the Hannukainen mine was planned. This review however focuses on the Swedish part.

16-74. Pajala had no mining activity before and the community had experienced a declining development for decades, which he characterizes as a state of "slow death". Jakobsson's results point to massive support for the planned mine and he concludes that it was seen by locals as perhaps the only chance to have positive social and economic development in the area. It should be noted that the mine in Pajala is currently closed due to bankruptcy.

***Jakobsson and Segerstedt* (2014)** examined how people in two longtime mining towns in North Sweden - Gällivare and Kiruna - perceived their communities. The study paid particular attention to aspects related to the ongoing urban transformation caused by mining, as parts of these towns are being moved to maintain underground iron ore mining. The authors note that the study was conducted before the fall of iron ore prices, and that the communities at the time experienced strong economic growth and extensive plans to develop both towns. The empirical data was gathered through a survey which received 2500 responses of people between 20 and 80 years of age. The survey was designed based on a social sustainability perspective, understood as "processes which provide social, cultural and economic benefits to both women and men, to different people regardless of background and way of life, to different types of businesses, trade and sectors of the labor market, and for the natural environment. Social sustainability from the perspective of the individual is understood as the possibility to live giving, meaningful and happy lives. The survey asked questions both of a material and of a non-material nature. Jakobsson and Segerstedt provide a rich account of their results, combining quantitative survey data with qualitative results in the form of quotes from written survey responses. The results are categorized in five broad themes: (a) social climate (b) different generations and stages of life (c) urban transformation (d) built environment and housing and (e) leisure. Regarding social climate,

the authors received very similar responses from both Gällivare and Kiruna. About 21-25 % of respondents, depending on the municipality, felt that the social climate was open towards people from other cultures and different religions, while about 10-15 % felt that it was not. The remaining respondents were neutral on the matter. Overall, respondents felt that the social climate was less open towards Lesbian, Gay, Bisexual and Transgender (LGBT) people. Approximately 27-30 % of respondents (again, depending on the municipality) felt that the social climate was characterized by gender equality, while approximately 16 % disagreed. The authors' results also show that there are differences between different generations and genders in how the social climate is perceived. The respondents were also able to write comments, and Jakobsson and Segerstedt's analysis of these suggests that the respondents are already committed to changing and developing the social climate in Gällivare and Kiruna, from the single-industry mining towns of yesterday, characterized by "macho" attitudes, towards more open and inclusive communities. Respondents wanted to preserve the positive aspects, such as closeness and ease of creating and maintaining social contacts, but also open up these possibilities to everyone, regardless of social background, values or preferences. Jakobsson and Segerstedt argue that Gällivare and Kiruna are developing into even more open, tolerant and inclusive communities in terms of social climate, which makes them more attractive to residents as well as outsiders. Next, Jakobsson and Segerstedt report how different generations viewed living in the region, and we briefly summarize some findings here. A majority of respondents regarded their municipalities as good places to raise children. Respondents were, however, much more negative toward young people's

abilities to establish independent lives the main reason being the shortage of housing, which was even cited as "hopeless". Some respondents also called for efforts to develop other industries such as tourism, arguing that "not everyone can or wants to work in the mine". Other aspects of community life that were highlighted include activities for youths and to what extent the care for elderly residents could be met in the future, as the population is ageing. Respondents viewed the urban transformation as mainly positive, with opportunities to improve different aspects of the towns, but they also wanted more information and more opportunities to influence the process. Jakobsson and Segerstedt conduct additional analyses of their data with particular attention to understanding if residents planned to stay or leave. The main conclusion from the study is that an overall perspective is necessary in the urban transformation, as social sustainability aspects such as dissatisfaction with the built environment, public services and social climate are strongly connected to whether residents consider leaving the municipality or not. Thus, Jakobsson and Segerstedt conclude that social sustainability is crucial for making Kiruna and Gällivare attractive and desirable places to live.

***Nilsson* (2010)**, like Jakobsson and Segerstedt above, has been studying the affects of the decision by the municipality of Kiruna to relocate parts of the town a few miles northwest due to the eventuality that the central parts of the town will collapse as result of mining activity. The study examines the ideological bias that characterizes various opinions in relation to the relocation plans, and especially the views of those in favour of the move, the mining company and the majority of the municipality of Kiruna. The article deals with demographic processes in the context of an urban transformation.

A recent study by ***Sjöholm* (2016)** in turn illustrates how Kiruna towns's officially recognized built heritage (Kiruna is designated heritage site since the 1980s, and includes a large number of protected buildings)

has been challenged by the ongoing urban transformation in Kiruna. Conservation goals are not clearly stated in the urban planning process and there are differing ideas for how to manage historic buildings during the urban transformation. These ideas shift both over time and between stakeholders, and the outcome of the urban planning process depends on a balance between the discourses of heritage conservation, urban development and architectural production. During the urban planning process some parts of the town's official heritage have been reaffirmed as built heritage, while others have been dismissed.

***Abrahamsson et al.* (2015)** discuss socially sustainable development in the mining industry and the communities surrounding the mines. The discussions are based on results from a pre-study and literature review on mining and sustainable development conducted during 2013–2014 at Luleå University of Technology in Sweden. While the social dimension is now becoming more important to Sweden's mining industry, it is still a relatively underdeveloped dimension when it comes to sustainable development in general and the mining industry in particular, one reason probably being the lack of effective methods for capturing social impacts. The mining industry and the surrounding communities face many challenges that provide both possibilities and obstacles to socially sustainable development; e.g. aspects such as gender, work conditions and cultural aspects. For example, a strong mining workplace culture and community identity can create strong cohesion but also lead to excluding certain groups, rejecting new ideas and reinforcing obsolete values. Other challenges include recruitment, as well as health and safety in relation to an increased use of fly-in-fly-out contractors, and automation of mining. Some challenges relate to the effects of fluctuations in the mining market.

As a segue to the next section, it should be noted that this report contains three different sections on social sustainability. Even though the reconciliation of livelihoods can also be considered an economic theme, in the context of sustainable mining, it appears to have a stronger connection to the theme of community identity. The next major theme will discuss social sustainability in terms of economic impacts and regional development perspectives, and in this section we will see that there is in fact little Finnish literature evaluating the economic impacts of mining.[1] Thus, the majority of research in this next section hails from Sweden.

4.4 SOCIAL SUSTAINABILITY: SOCIO-ECONOMIC IMPACTS, REGIONAL DEVELOPMENT PERSPECTIVES

Table 3 (next page) provides an overview of studies that examine the socio-economic impacts of mining, as well as research on the implications of mining for regional development. Under the heading "major sub-themes", we attempt to briefly summarize the main topic addressed by each study.

There is relatively little research in the Finnish literature about the direct socio-economic impacts of mining on individuals, communities or regions. Most of the economically-oriented research has to do with reconciling land uses, in particular mining with subsistence livelihoods, and discusses the local impacts of reconciliation. That said, there are several studies on the economic impacts of individual mines, and also on mining in general, with respect to local and regional development conducted by Ruralia Institute (University of Helsinki). The Institute uses the RegFin and RegFinDyn models (regional general equilibrium

1 Only the Ruralia Institute has conducted this type of analysis.

Table 3. Research on socio-economic impacts and regional development perspectives

EX ANTE STUDIES

MAJOR SUB-THEMES	FINLAND (Authors)	SWEDEN (Authors)
1. Reconciliation of land uses	Kokko et al. 2014	—
2. Economic impacts on local and regional development	Törmä & Zawalinska 2007 Törmä & Reini 2009a & 2009b Laasanen 2010, Törmä et al. 2013 Laukkonen & Törmä 2014	—
3. Effects on employment, income, gross region product and population	—	Sörensson 2003
4. Socio-economic effects of new mines on employment and population development	—	Lind 2009 Ejdemo and Söderholm 2011 Ejdemo 2013
5. Future need for mining industry labor	—	Tillväxtanalys 2010

EX POST STUDIES

6. Employment change and restructuring in mining and related industries / implications for local and regional development	—	Knobblock and Pettersson 2010 Wiberg 2009
7. Changes in mining employment organization and affects on other sectors and gender equality	—	Knobblock 2013
8. Propensity score matching estimator method (PSM) to examine labour income effects of the mining boom in northern Sweden	—	Tano et al. 2016

simulation models[1]) for estimating economic impacts. Their reports estimate that mines, and mining investments in general, will support the economic growth, taxes, and population increase in municipalities, sub-regions and in the county of Lapland **(*Törmä & Zawalinska* 2007**; ***Törmä & Reini* 2009a** and **2009b**; ***Laasanen* 2010**; ***Törmä et al.* 2013**; ***Laukkonen & Törmä* 2014**; ***Törmä et al.* 2015)**.

The DILACOMI project contains one of the few discussions regarding regional effects and it is in the context of land use, specifically that mining precludes the use of land area by others because this use can only be located where a given deposit is. ***Kokko et al.* (2014)** state that in terms of reconciliation, it is essential to credibly and comprehensively assess the local and regional effects of a mine. This involves not only surface areas but also the functions, values, and meanings attached to the areas. If mining changes the environment extensively so that other actors must give up their activities and livelihoods, or they cannot reach their goals in a feasible way, then it is no longer a matter of reconciliation. Instead, things may lead to an irreconcilable conflict situation (Kokko et al. 2014).

Perhaps the largest amount of research on sustainable mining in Sweden is in the area of economics, specifically the past and future economic benefits and impacts on communities, on local economies and on regional economies too. In this synthesis report, the theme of economics is understood as a social phenomena and not a purely economic one.

It should be noted that while there is a dearth of socio-economic research on mining effects in Sweden, the focus is different from that of Finland, because instead of concentrating on the reconciliation of different land uses and livelihoods, the Swedish research looks mainly at the effects of mining on employment and demography. In part this is due to the longer

1 http://www.helsinki.fi/ruralia/research/models.htm and http://www.helsinki.fi/ruralia/research/pdf/regfindyn.pdf

history of mining in Sweden as mining and other natural resource-based industries have been major driving forces in the development and industrialization of northern Sweden. This is not the case in Finland where the mining industry has only become a significant player in terms of regional development since the 1980s. Northern Sweden's early urban development can to a great extent be seen as the product of the natural resource based industries (e.g. Westin, 2011; Knobblock, 2013), and in particular the mining industry, as a number of towns in the interior of Västerbotten and Norrbotten counties were once developed to provide housing and services for mine workers and their families, and the needs of the mining industry have been important factors in the development of infrastructure in North Sweden. The mining industry in the region, which is dominated by two long-standing companies (LKAB and Boliden), has remained competitive (although at times barely so) while facing comparatively high labor costs and increasing international competition. One of the ways in which it has achieved this is through continued technological progress which has enabled productivity to increase. Over time, however, rationalizations in existing operations and closures of depleted mines have reduced the number of workers employed in North Sweden's mining industry. A contemporary mining operation requires far less manpower to produce a given quantity of ore compared to the mines of the 1950's. The constant striving to increase the productivity of labor has been a necessary strategy for most producers of goods and certainly for all sectors that face international competition. This has enabled Sweden's economy to continue to prosper, but has also caused significant structural change, which is one of the factors that have contributed to the overall decline of North Sweden's interior since the

1950's, including previously flourishing small mining towns.

Based on the amount of published material, the economic impacts of mining in North Sweden have received a good deal of attention from researchers and analysts since the early 2000s. Several of these analyses consist of ex-ante economic impact studies, which estimate the potential local or regional impact of new mining projects on employment and demographic development using simulation models. Many of these studies show distinct similarities in methodology, as they employ the regional impact model rAps which has been developed by the Swedish Agency for Economic and Regional Growth. The rAps model combines an economic and demographic model built around an input-output model of regional production. While input-output techniques have been used extensively to examine the economic impacts of mining (see for instance Söderholm and Svahn 2015, for a review of international literature) several forms of critique have been directed against the use of input-output modeling. Critics have mainly pointed to the static nature of the technique and that it typically does not account for important dynamic aspects such as crowding out effects caused by higher wages, changes in technology, innovation, agglomeration effects etc. Söderholm and Svahn note that other assessment methods have received interest, as they overcome some of the weaknesses of input-output analyses. These include (i) computable general equilibrium (CGE) models which address relative price changes following changes in the economy, and (ii) ex post econometric modeling. In Finland, CGE models have been applied to examine the economic effects of new mines (see the literature cited above from Ruralia Institute). A noteable strength of CGE models is emphasized by Törmä et al. (2015) - CGE models can account for resource restrictions such as a limited pool of labour, and/or insufficient capital or land in a region. In the Swedish economic impact studies which employ the rAps model, these aspects have to be addressed by assumptions rather than

modeled endogenously (i.e. labour supply), or they are not considered at all (i.e. potential crowding out effects of higher wages and/or prices). One can thus argue that future *ex ante* economic impact studies of new mining ventures in Sweden would benefit from the development of a Swedish regional CGE model. For improved knowledge of the economic impact of mining, continued efforts to conduct ex post econometric studies is needed in Finland as well as Sweden.

A common trait of the *ex ante* impact studies from Sweden is that they appear to have been commissioned either by mining companies or by authorities to address the potential impacts of a given project. Such studies are typically intended to assist in preparing for challenges in, for example, skills supply and/or housing, or to assess the trade-offs between benefits and costs generated by a project (e.g. new jobs vs. environmental degradation and other disruptions). Only a limited number of studies appear to originate from more long-term academic research projects intended to contribute new knowledge or advances in methodology.

***Sörensson* (2003)** employed the regional impact model rAps to estimate the potential economic impact of two planned gold mines in Västerbotten County. The study focused on the potential effects on employment, income, gross region product (regional GDP) and population during the period 2000 to 2010, in the adjacent municipalities of Lycksele, Malå and Storuman. Sörensson used the rAps-model to forecast a reference scenario, which describes a likely development in the region if the two mines are not developed, i.e. assuming "business as usual". He then estimates a scenario where the two mines are introduced, which

enables him to compare the outcomes of the two scenarios[1] to assess the potential effects of the new mines. According to information supplied from the mining companies, the two mines would generate about 250 new "direct" jobs and about 1 250 million SEK investments during the period 2003 to 2010. Sörensson's results suggest that, as one would expect, the impacts on the regional economy are significant during the construction period, but the effects are smaller during the later years of the period. His results indicate that the multiplier effect on employment is 1.68, meaning that for every 100 jobs created in mining as a consequence of the project creates an additional 68 jobs in other sectors. His study also suggests that disposable incomes increase by 112-120 million SEK and that gross region product (regional GDP) increases by 71-75 million SEK, compared to the reference alternative. The last set of results presented by Sörensson concerns the population development in the region, which is in a state of decline. The study suggests that the new mines could slow down the decline in population, but would not reverse the negative development.

***Lind* (2009)** also employed the rAps-model to examine potential socio-economic effects, specifically the impact of new mines on employment and population development, in five municipalities in Västerbotten County. The study region exhibited a negative trend in population as well as employment. Similar to Sörensson (2003), Lind first forecasts a reference scenario, against which the effects of new mines can be evaluated. Two alternative mining scenarios are developed, and they reflect "low" and "high" levels of direct employment at the mines (770-1070 jobs), as well as different assumptions regarding mine lives.[2] His results indicate that the new mines could create up to 1221 jobs in the "high" alternative. The

1 It should be mentioned that alternative scenarios with different assumptions about growth rates were also developed in the study.

2 Mine lives means the full lifespan of the mine. The study tested "low impact" scenarios where mine life was limited to about 10-12 years, and "high" where mine life extended through (and beyond) 2030, which is the end year of the possible forecast period in the rAps impact model.

estimated multiplier effect on employment is between 44 to 53 additional jobs for every 100 jobs in mining, depending on the scenario assumptions. Lind notes that the multiplier effect is lower in the "high" alternative, as this requires higher levels of commuting to the region which leads to relatively lower "indirect" employment effects even though the total impact is larger. His results also indicate that the new mines could lead to improved population development, but the estimated effect is not large enough to reverse the decline. Lind notes that while jobs are important, it takes more to attract inhabitants to a community in modern society. He argues that a possible scenario could resemble the development in Australia, where mine workers live in larger cities and commute on a weekly basis to remote mining locations, which would diminish the positive impacts on employment and population development in the mining communities. An alternative possibility is the emergence of qualitative effects that were not included in the model exercise, such as the potential growth of new local businesses linked to mining and other spin-off effects which could lead to a greater positive impact.

Yet another analysis which used the rAps-model was presented by the Swedish agency for growth policy analysis – ***Tillväxtanalys* (2010)**. They explored the future need for mining industry labor in Gällivare, Kiruna and Pajala, and the capacity to meet this need. The study was motivated by large investments that were being undertaken by the mining industry in these three municipalities at the time. Tillväxtanalys employed the rAps-model to estimate the demand for labor generated by the expanding mining industry in Kiruna and Gällivare, and the impact of the new Kaunisvaara iron ore mine that was planned in Pajala.

Alternative scenarios were also developed using different assumptions about the demographic impact of the expanding mining industry (i.e. increased commuting to the study region vs. influx of new residents). The results suggest that the mining industry in North Sweden has a local employment multiplier of between 1.4 (for Pajala) to 1.6 (for Kiruna). The higher estimate for Kiruna is explained by the larger and more diverse economy with stronger linkages to mining, compared to Pajala. Overall, Tillväxtanalys estimates that the expanding mining industry will have positive impacts on employment and incomes, but the study points to challenges in the access to labor. Even in the expansive demographic scenarios, the local labor force is estimated to decrease over time and labor supply depends heavily on outside commuters. The authors emphasize that the results reflect quantitative estimates which rest on assumptions that may be questioned. Tillväxtanalys argues that the potential to meet labor demand by increased commuting to the study regions is limited by the fact that they largely compete for the same labor, and they conclude that improved net-migration thus appears to be the most feasible option. Based on a comprehensive analysis which is only partly addressed in the short review here, Tillväxtanalys argues that all three municipalities essentially face the same challenge -- to support an adequate local supply of labor and to achieve a sufficient level of "attractiveness" to generate in-migration.

Another estimate of the economic impact of the planned Kaunisvaara iron ore mine in Pajala was presented by ***Ejdemo and Söderholm* (2011)**. Their analysis differs significantly from the study by Tillväxtanalys (2010) mentioned above, in that Ejdemo and Söderholm based their estimate on a previous plan for the mining project in which the workforce anticipated to operate the mine was significantly larger at a total of 1071 workers. This previous plan also encompassed the construction of a pellet plant adjacent to the mine. The authors employed the rAps model to estimate

reference- and mining scenarios. Exogenous assumptions were made which reflect an expansive demographic development as a response to the improved local labor market. Depending on the demographic outcome, the results suggest that the Kaunisvaara iron ore mine could potentially create 1000 to 1500 additional jobs, largely in the non-mining related sectors. The study thus suggests an employment multiplier slightly above 2. In the most expansive scenario, annual disposable income per capita increases by 63 000 SEK and the municipal tax revenues essentially double compared to the reference scenario due to the significant increase in local residents with relatively well paid jobs. The authors caution that the estimated impacts: "…should primarily be viewed as addressing the strength of the demand shock to the regional economy following the mineral venture". And in addition, that their estimates: "…do not explicitly address important supply constraints that may exist (e.g. attracting the necessary labour force, road infrastructure, etc.). They argue that the results may indicate the potential for local economic development, but specific policy measures that further strengthen the regional economic linkages (e.g. vocational training) may be required.

***Ejdemo* (2013)** revisited the potential employment impacts of the Kaunisvaara project in Pajala, as the plans for the mine were significantly revised compared to the information which was used in the study by Ejdemo and Söderholm (2011). This more recent study considered a mining operation with about 500 on-site workers and 200 truck drivers employed in the transportation of concentrate, instead of 1071 on-site workers as indicated by the previous plan. In addition, the plans to construct a pellet plant had been abandoned. Ejdemo notes that the previous study by Ejdemo and Söderholm (2011) imposed an

expansive assumption regarding demographic development to indicate a potential impact if labor demand could be met with in-migration instead of commuting[1]. In this new study, partly motivated by the reduced magnitude of the mining project, a more modest effect on the demographic development was assumed which conformed more closely to the contemporary demographic trend. The regional impact model rAps was again employed to estimate the economic impact of the project. The results indicated that the mining project could create a total of 1050-1100 local jobs, including 350-400 by indirect and induced effects. This suggests an employment multiplier of about 1.5. Different assumptions about in-migration vs. commuting to service labor demand at the mine were also imposed in the scenario exercise. These did not however lead to major differences in the estimated total impact on employment, but the effect was significant in the results for employment among local vs. non-local workers (i.e. commuters). Even in the most expansive scenario where 90 % of the Kaunisvaara employees were assumed to move to Pajala from elsewhere, labor demand remained highly dependent on outside commuters[2], according to the regional impact model. The results also showed that local taxable income barely increased in a scenario where most of the labor demand was met by commuters, while the most expansive scenario indicated an increase of approximately 194 million SEK as the local economy was able to retain more of the wages earned in new jobs generated by the project. The impact on the regional economy of Norrbotten County was also estimated using similar assumptions and the results indicate that the indirect impact on employment during the operating phase was about 25 to 30 % higher than on the local level, and

1 For example a fly-in/fly-out type solution to meet labor demand.

2 The study estimated that net commuting in the most expansive scenario was about 990 persons, which was equal to about 30 % of total estimated employment in Pajala (i.e. the entire local economy including mining and non-mining related sectors).

50% higher during the investment phase. The study indicates that mining in Norrbotten County has a regional employment multiplier of about 1.7. This is explained by the larger and more diverse regional economy. The impact on taxable income was significantly larger on the regional level, as the region is home to many of the workers that would commute to Pajala. In addition, it is argued that most white collar jobs associated with the project could be located outside Pajala, but likely retained within Norrbotten County. The study concludes that the local benefits depend on the demographic outcome, and more specifically, whether or not workers will move to the community or commute. An enclave-type mine with non-local workers means that the community retains far less economic benefit compared to an outcome with local workers. The limited labor force available shows that the community has to successfully attract new residents, to achieve such an outcome.

While the *ex ante* studies cited above all predict declining employment in the mineral extraction sector, mining persists as an important local employer and it remains one of the key industries in North Sweden. One indicator of this is the considerable attention given to mining in regional development work such as Norrbotten and Västerbotten counties having developed a joint minerals strategy[1] which highlights mining as an important part of achieving sustainable economic development in the area. The document also recognizes the many challenges associated with

1 "Regional strategi för innovativ och hållbar utveckling av mineralsektorn i Norrbottens och Västerbottens län – 2025". Available at: http://www.lansstyrelsen.se/Norrbotten/SiteCollectionDocuments/Sv/publikationer/naringsliv%20och%20foreningar/regional-mineralstrategi-norrbotten-vasterbotten.pdf

minerals extraction and emphasizes that mining must be conducted in a sustainable way, which involves balancing economic growth through resource exploitation with competing land use interests and environmental concerns. Given the continuing importance of the mining industry in North Sweden, there is also a number of *ex post* studies that look at the past effects of mining's impacts on the region. These are presented below.

***Wiberg* (2009)** examined conditions for long term sustainable growth of the mining and mineral industry in Västerbotten county. He describes how restructuring processes has transformed goods production, also including the mining and mineral industry, towards an increased focus on core activities and outsourcing of former in-house functions to other businesses. He notes that these related businesses may be located within the region, or in other parts of the world, depending on their competitiveness and competence. The mining industry has an extensive need of equipment, transports and other services that have to be procured from other businesses, and the various actors that form this value chain can be described as a mining cluster. Wiberg describes how such a regional mining cluster has formed around the Skellefteå field – a mining area in Västerbotten county with Boliden as the main mining company, serviced by a number of smaller businesses of which several have expanded to the international market. He lists some of these companies, and notes that a previous analysis by the mining NGO "Georange" had identified close to 100 companies in Västerbotten county that were connected to the mining industry. In his report, Wiberg discusses the possibilities to develop this mining cluster further through an active cluster process to capture the potential offered by the influx of new mining and exploration companies during the mining boom. He argues that a successful cluster process could not only generate new employment in Västerbotten, but would also reduce the vulnerability of labour demand compared to an outcome

where only mining and exploration businesses expand.

***Knobblock and Pettersson* (2010)** examine employment change and restructuring in mining and related industries in Västerbotten County and consider the implications for local and regional development. They note that restructuring and rationalization processes have reduced the importance of the extractive industries since the 1950s when more than 12 000 persons worked in mining in Västerbotten County. However, liberalized mining legislation in the 1990s, which allowed the entry of foreign companies in Swedish mining, followed by the global mining boom in the 2000s, led to renewed interest in mining in Västerbotten. The study is based on quantitative data for the years 1990-2007 as well as semi-structured interviews with 15 respondents from the mining sector. The authors present a conceptual model of the mining industry's production system, where *core activities* (exploration, mining, mineral dressing) are distinguished from *related activities* (development of equipment, drilling, transports). Knobblock and Pettersson found that the number of jobs directly in mining have declined over time in Västerbotten (although it has increased in recent years). At the same time, companies had transitioned towards increased out-sourcing in favor of focusing on core activities and cost efficiency in line with international trends. The authors argue that the industry is characterized by an increased flexible specialization, which has led to growth in employment within mining-related areas. These include knowledge intensive activities such as consulting, the development and manufacturing of equipment, and also in more labor intensive activities such as mining and transportation subcontracting. In fact, they found that at the time of the study, there were more jobs in related activities than in mining even though some

firms that participated in mining-related activities were not registered in the official statistics as such. The use of non-local labor is another aspect examined in the study and the authors found that although the mining areas were sparsely populated, they were within reach for daily commuting from the surrounding area. According to the study, there was no need for large-scale commuting solutions such as the fly-in/fly-out model of non-local labor supply, at the present scale of operations in Västerbotten. In fact, the authors found that many companies "…prefer local employees due to their local knowledge and mining experience". Knobblock and Pettersson (2010) conclude with reflecting on sustainable development and argued that although expansive mining investments were being undertaken in Västerbotten: "…exhaustion, shifts in demand and short-term mining investments affect municipalities in the region when planning for social services, housing, land use etc.". Furthermore, they note that the new mines considered in the study tended to be small and short-lived, making it difficult to attract non-local labor to become residents in the area, and they conclude that at this stage: "…neither core nor related mining activities can alone reverse the declining tendencies in Västerbotten's mining districts".

***Knobblock* (2013)** extended on previous work by analyzing changes in the ways in which mining employment is organized and how such changes may affect other sectors and gender equality. The article presents a case study of mining in Västerbotten County and is based on key informant interviews with 15 mining related companies in the area, as well as an analysis of quantitative data for the years 2000 to 2008. Knobblock finds that an organizational change has occurred in the form of increased outsourcing on the local or regional level, which confirms the results of the previous study (Knobblock and Pettersson, 2010). This transition towards outsourcing to replace former in-house production systems reduced risks faced by mining companies. It also presented business opportunities,

and Knobblock finds that social embeddedness (i.e. formal and informal networks between mining companies and other actors) have contributed to an innovative environment where a number of new businesses have been started and participate in both core and related mining industry activities. More women have also been included in the field. With respect to the use of non-local labor, the author found that approximately 90 % of the labor force in the mining sector in Västerbotten lives less than 50 km from work. Foreign companies prefer hiring local staff in an effort to be perceived as "local". Knobblock concludes that the study identifies aspects that may contribute to strengthening the sustainability of peripheral mining communities and argues that: "Future development potential is no longer dependent on the resource alone; rather, the long-term experience from mining is used to produce products and services to be sold elsewhere and to be used in other industries. Development, she emphasizes, depends on how successful companies are in adapting to changing global market conditions.

***Tano et al.* (2016)** provide a recent ex post study on the economic impact of mining in North Sweden. They used a propensity score matching estimator method (PSM) to examine labor income effects of the mining boom, based on data for the years 2004-2010. A simplified description of the methodology is that it essentially compares income change among residents in mining areas, against income change among comparable residents in other geographic areas (i.e. a control group). Results are reported as the *average treatment effect of the treated*, indicating (in SEK) the change in labor income among residents of mining regions compared to residents in other regions (i.e. the control group). Tano et al. find that the mining boom caused a substantial growth in labor incomes in the

case study areas. The major impact occurred in sectors closely related to mining, such as “Manufacturing and Extraction” and “Construction“. Separate results are presented for Norrbotten and Västerbotten counties, which indicate that the impact of the mining boom on labor income is much stronger in Norrbotten. For example, the effect on labor income in “Manufacturing and Extraction” between the years 2004-2010 is estimated to be slightly above 71 000 SEK in Norrbotten (compared to the control group) and approximately 15 500 SEK in Västerbotten for the same years. The impact also involves more sectors of the economy in Norrbotten than in Västerbotten. One likely reason is that investments were larger and more concentrated in Norrbotten during the period. In addition, Tano et al. observe a relatively large effect on incomes in the “Retail” and “Service” sectors in Norrbotten, but not in Västerbotten. This suggests that the mining boom had a stronger impact on consumption in Norrbotten. Tano et al. argue that some possible explanations for the differences between the two counties could be that mining towns in Norrbotten are more dominated by mining, and that in comparison to Västerbotten, they are also more distant from regional centres.

4.5 SOCIAL SUSTAINABILITY : INDUSTRY CULTURE, HEALTH AND WELL-BEING

In table 4 (next page), an overview of studies on this theme is provided. The main topic addressed by each study is summarized under the heading «major sub-themes».

The last of the sub-topics on social sustainability focuses on the conditions within the working environment of the mining industry itself. In general, there is much less research that has been done on this topic than in the other areas of social sustainability, especially when it comes to the analysis of economic impacts. In Finland, the main research project, Minehealth, looks not only at the social wellbeing and

Table 4. Research on mining industry culture, health and well-being

MAJOR SUB-THEMES	FINLAND (Authors)	SWEDEN (Authors)
1. Social well-being and health of employees, environmental risk and migrations and environmental change	Viinamäki et al. 2015	—
2. Knowledge workers' well-being in the mining sector	Salmi et al. 2014	—
3. Technical development of underground mining in Kiruna and the implifications for qualifications, identity and gender	—	Abrahamsson and Johansson 2006
4. Gender and tradition in modern mining via LK-AB's mines in Kiruna and Malmberget	—	Andersson 2012
5. Challenges faced by Swedish mining companies and surrounding mining communities when it comes to socially sustainable development	—	Abrahamsson et al. 2014

health of employees, but also at environmental risk and mitigations and environmental change. ***Viinamäki et al.*** **(2015)** present a structural analysis of socio-economic challenges in the mining industry throughout the entire life cycle of the mine, including start-up, operation, and closing. The study is carried out in the Barents region via four case examples, and includes an additional one too, Kevitsa mine in Sodankylä.

According to Viinamäki et al. (2015), from the viewpoint of the municipalities' socio-economic development, the positive themes of mining projects include the provision of good and stable jobs, the

companies' joint social programs with municipal operators, and co-operation with the Sami people and reindeer breeders. Some of the negative themes highlighted include workers' issues with the lack of housing, the failures in recruiting women for mining work, and issues related to nature conservation. One of the more interesting findings is that once workers began working in the mine, their lives changed mostly for the better; however, differences do exist between countries. The workers at the Sodankylä Kevitsa mine experienced the most negative changes for an individual variable -- only four out of 17 dimension of life variables were felt to be more positive after starting to work at the mine. In the Swedish data, this was not the case for any variable.

Viinamäki et al. (2015) suggest that the so called Sustainable Society Index (SSI henceforth) could be adopted as the contextual frame of reference for analysis, because it integrates human and environmental wellbeing. While economic wellbeing is not a goal in itself, it is considered a necessary condition for achieving the other two. If all of these aspects are taken into account, in the best case scenario, the opening of a mine would not constitute a competitive factor for the local community's traditional way of life and traditional trades; rather, the mining operations would create alternative employment opportunities and reflect positively in the direction of the municipality's migration trend and general life opportunities in the region.

***Salmi et al.* (2014)** focuses on the well-being of knowledge workers (IT specialists, engineers, geologists, environmental analysts, finance professionals and mining planners) in the mining sector as they are seen to play a crucial role in developing and improving operations in mining organizations. In fact, knowledge workers with high special professional profiles will likely be the most sought-after employees in the future mining industry. Knowledge-intensive work is considered mentally demanding because it constantly requires new expertise and time pressure factors

are explicit. Additional demands peculiar to the mining industry in the North come from the long distances resulting from such geographically and socially isolated locations, and these issues create concern for the well-being of knowledge workers in mining organizations.

In the context of work, knowledge is formed in the reflective and self-reflective experiential acts of knowledge workers, and well-being is constructed through authentic experiences in their actual life settings, including the work environment. It is thus vital for knowledge workers to find a functional balance between mental demands and self-care in order to create and maintain their well-being. Otherwise, there are no productive knowledge workers. Additionally, in the case of human resources and leadership, it is vital to find out ways to produce loyalty, employee self-worth, psychological involvement and feelings of being integral to the organizations; this is especially needed in the mining industry that is growing in arctic regions. Creating a functional social identity for working groups requires the leader to adopt a psychological perspective and cultivate a leadership style that supports both individual and collective well-being. Finally, Salmi et al. (2014) argue that there is a particular need to develop a new positive leadership approach to support the well-being of knowledge workers.

***Abrahamsson and Johansson* (2006)** have studied the Kiruna iron ore mine for 50 years of its life span in order to reflect on the technical development of underground mining in Kiruna and to consider the implications it has on qualifications, identity and gender. Modern technology has created a new type of work in terms of competencies, knowledge and workload as it has over time been transformed from occurring completely underground to now being remotely controlled

at the surface level, which has led to great improvements regarding the physical work environment. The authors have also seen a change in knowledge from the old, obsolete physical and tacit knowledge and skills to something new, which they describe as abstract knowledge. The fact that women and men now are able to do the same work has challenged male mine workers' identities, and the traditional mining culture seems ill-prepared for the challenge.

Literature that targets socially sustainable development in the mining industry from a gender perspective is not extensive and mainly focuses on mining in developing countries as well as on other social problems. ***Andersson* (2012)** is one exception and she has, through interactive workshops, studied gender and tradition in modern mining through LKAB's mines in Kiruna and Malmberget. She has found that women mainly are found in jobs and tasks away from the core production, for example as drivers of loaders. The aim of the thesis is two-fold: first, it is to examine how masculinity is consolidated and maintained in a male-dominated mining workers' collective in a Swedish mining company; and second, if and how similar gender structures are changing, spontaneously, by voices within the professional community or by pressure and external demands.

***Abrahamsson et al.* (2014)** show that Swedish mining companies, and also surrounding mining communities, face many challenges when it comes to socially sustainable development. For example, a strong mine workplace culture coupled with a strong community identity can create both strong cohesion but also lead to exclusion of certain groups, rejection of new ideas and reinforce traditional, masculine values. Other challenges include recruitment, health and safety in relation to an increased use of contractors, and the automation of mining. The social dimension is relatively underdeveloped when it comes to sustainable development in general and the mining industry in particular. This

report reviews research on socially sustainable development and mining with a special focus on (1) diversity of lifestyles, (2) gender, and (3) work conditions. All three areas of research can be regarded as mature and they contribute significantly to our understanding of socially sustainable development in relation to the mining sector even if they do not always explicitly discuss sustainable development in mining.

4.6 LEGAL FRAMEWORKS AND REGULATORY ASPECTS

Table 5 provides an overview of studies which address legal and regulatory aspects. Under the heading "major sub-themes", a brief description of the main topic addressed by each study is provided.

Research on impact assessments in Finland is ubiquitous, but when it comes to mining-specific or northern-focused literature, the field becomes much smaller. There are a few examples, however, one of which is the concluding report of *Sustainable Mining, Local Communities and Environmental Regulation in the Kolarctic Area* in which environmental impact assessment and regulation in general are widely discussed within the overall context of sustainability **(*Kokko et al.* 2015)**.

***Suopajärvi* (2013)** has evaluated social impact assessments (SIA), a part of the environmental impact assessment procedure in Finland, in mining projects in Finnish Lapland during the 2010s. She argues that not only do SIAs have a minor role in the environmental impact assessment procedure, but there are problems in identifying vulnerable groups and the social heterogeneity of local communities in general. In a subsequent study, Suopajärvi (2015) analyzes social impact assessments by using a qualitative, discourse analytical approach. She describes how SIAs

Table 5. Research on legal frameworks and regulatory aspects

MAJOR SUB-THEMES	FINLAND (Authors)	SWEDEN (Authors)
1. Mining legislation & reform	Koivurova & Petrétei 2014	—
2. Impact assessments including Social Impact Assessments	Kokko et al. 2015 Suopajärvi 2013 Suopajärvi 2015	—
3. Transboundary Environmental Impact Assessment	Koivurova et al. 2015	—
4. Design and implementation of environmental regulations	—	Söderholm et al. 2015
5. Legal Analysis of mining regulations in Sweden, Finland and Russia	—	Pettersson et al. 2015
6. Sami rights and mining in Finland	Koivurova & Petrétei 2014 Muroke 2015	—
7. Sami rights and mining in Sweden	Koivurova et al. 2015	—
8. Kallak case in Sweden	Koivurova et al. 2015	—
9. Rönnbacken Case, where exploitation concessions were granted to a private mining company over a traditional reindeer herding area	—	Labba 2014 and Åhren 2015
10. Extensive jurisprudential study (PhD thesis) on Swedish mining law	—	Bäckström 2015
11. Analysis of critiques against the recently developed Swedish mineral strategy	—	Haikola and Anshelm 2015

legitimate the approval of the proposed mining projects by using three main story lines. The first story line maintains that mines are essential as a livelihood and for the future of the remote regions in Lapland. In the second storyline, mines are important because they serve the general interest of Lapland. This storyline encourages people to sacrifice their natural environment and private interests for the general good. The third storyline argues that there is plenty of room for mining and all livelihoods to operate in sparsely populated Lapland. In this storyline there is no intrinsic value to the nature and the environment is regarded as replaceable. Hence, SIAs are giving companies the right to mine and are not critically assessing probable social impacts of the mining projects in the planning phase.

There is also research about transboundary environmental impact assessments. ***Koivurova et al.* (2015)** have researched transboundary environmental impact assessments in the North Calotte/Kola Peninsula and conclude that TEIA should be undertaken by the region's nation-states by applying the international TEIA convention known as the Espoo Convention, and by adhering to best practice documents such as the Guidelines for Environmental Impact Assessment in the Arctic which, among other things, also provide guidance on how to perform a TEIA in Arctic conditions.

In Sweden, the research on environmental regulations tends to be from the permitting and licensing perspective and how to make these processes more efficient. ***Söderholm et al.* (2015)** investigates the design and implementation of environmental regulations which could achieve desirable environmental outcomes while sustaining competitive strength in the mining industry. Their study examines environmental

permitting processes in Sweden, Finland and Russia and provides a conceptual analysis of the impact of environmental regulations on mining competitiveness using an analytical framework which addresses the flexibility, predictability and stringency of the regulations. These concepts are then illustrated and exemplified in the empirical context of environmental permitting processes in Finland, Sweden and Russia. The authors analyze specific permitting processes as well as reports by company representatives. In addition, they interviewed companies that have applied or planned to apply for a permit. Söderholm et al. conclude that: "...the environment-competitiveness trade-off is highly dependent on the design and implementation of the regulations, and that there often is scope for achieving positive environmental outcomes without seriously jeopardizing the long-run competitiveness of the mining industry". They found that environmental regulation in Finland, Sweden and Russia lacked timeliness and predictability, which was manifested as uncertainty about the interpretation of legislation and delays due to appeals. To address this, they propose that more resources should be allocated to the regulatory authorities, that more consensus-based interaction between companies and authorities is implemented in the regulatory process, and that more standardized procedures for EIA, permit applications and for interpretation of legislation should be introduced.

Pettersson et al. **(2015)** provide a legal analysis of mining regulations in Sweden, Finland and Russia and a comparative analysis of the scope of the environmental assessment in the licensing process. The study draws on qualitative document analyses of legislation, case law and relevant voluntary instruments, based on positive analytical jurisprudence. In addition, Pettersson et al. assess the potential use of novel instruments, which extends the methodology to include elements of normative and constructive jurisprudence. They note that the regulatory frameworks in these three countries are complex and

can even be regarded as unpredictable, due to "...constant revision and inconsistent implementation". The Swedish case under scrutiny is the license process for LKAB's iron ore mine Gruvberget in Svappavaara, Kiruna municipality. LKAB received a mining license in 2010, but it was appealed and the process ended up lasting several years. Pettersson et al. review the details of the case and find that there is uncertainty regarding what should be included in the application for an environmental permit in accordance with the Swedish environmental legislation. The Swedish Environmental Court of Appeal has established that an application must be "complete", which Pettersson et al. argue may offer little guidance to determine the scope of the environmental assessment in specific cases. In Sweden, mining is mainly regulated by the Minerals Act and the Environmental Code and permits in accordance with both legislations are required (i.e. mining concession and environmental permit). Pettersson et al. review the legal framework and find that there is "...an institutional path dependence where the inherent resistance to change has led to a lack of systematics and perhaps also an insufficient implementation of the objective of sustainable economic, ecological and social development". The assessment of the environmental impacts of a planned project, in accordance with the Environmental Code, is largely separated from the examination of an exploration and mining concession under the Minerals Act. This leads to subjective and varying assessments in addition to extensive possibilities to appeal, according to Pettersson et al. Their analysis suggests that it is typically not the environmental requirements which pose a challenge for mining companies, but the uncertainty about the scope of the environmental impact assessment, specifically what is considered to be part of the activity and thus what

should be included in the assessment. Pettersson et al. find that the efficiency of the licensing process is "…not only a function of what legal rules are in play, but also largely depends on the practices and approaches developed and applied by authorities and companies alongside the legal process". The overall results from the analysis point to great similarities between the Finnish and Swedish systems in terms of overall structure as well as the implementation of substantive environmental rules, while the Russian system is characterized by more declarative rules and "… seemingly less substantive assessments". The regulatory frameworks show some signs of institutional path dependence in all three countries. In comparison to the deficient systematics and conflicting objectives of the Swedish framework, the recently reformed Finnish system seems to have a more holistic approach, according to Pettersson et al.

***Bäckström* (2015)** presented an extensive jurisprudential study (PhD thesis) on Swedish mining law. The scope of the study is thus national. He notes that Swedish landowners have historically been forced to accept that their land is claimed by mining, and in addition, that third parties are entitled to extract minerals on privately owned properties under the current Minerals Act. Besides the principal question of ownership, he argues that the Minerals Act gives rise to a number of issues which pertain to the rights of landowners in relation to mining activities on their property. Bäckström's thesis consists of two main parts. In part I, he focuses on identifying "who, if anyone", under Swedish law can be regarded as the principal owner of the components of earth that contain minerals". The matter is clearly complex and he finds that previous studies have sometimes simply concluded that the issue of ownership remains "unclear". Based on his research, Bäckström argues that the rights to mineral deposits sometimes awarded to parties other than the landowner, can be regarded as restrictions of ownership rights. In part II, Bäckström considers the complex legal framework for mineral

extraction in Sweden, which consists of "several laws with wholly of partly different objectives". He examines how the main objective of the Environmental Code, to ensure sustainable development, is safeguarded in the licensing process, given the associated parallel application of "more or less independent laws". He reviews the permitting process and finds that while indicators on all dimensions of sustainable development can be identified at some point in the process, the procedure is not expedient to reflect all sustainability dimensions. The current legal framework around the permitting process, he argues, prioritizes the economic dimension of sustainability, partly at the expense of ecological and social dimensions. Bäckström proposes measures which could enhance the attention to ecological and social dimensions, including a more inclusive process by increased public consultations.

Haikola and Anshelm **(2015)** analyzed critiques against the relatively recently developed Swedish mineral strategy, which according to some opponents jeopardize social, cultural, economic and environmental values. They find discursive lines of conflict which concern the "construction and formation of future mining communities, the construction of institutional and legal relationships between mines and the environment and between mines and native Sami communities, and the construction and regulation of capital flows between local communities, regional communities, the national government, and multinational corporations". Haikola and Anshelm argue that while these discursive positions are concerned with concrete and material futures, they should also be understood as "abstracted understanding of the geographical places being contested, or rather abstractions regarding alternative routes". The conflicts in Swedish mining politics are based

on divergent understandings of places, which can be politicized only by taking abstracted forms. Haikola and Anshelm find that the opposition to the Swedish mineral strategy is "united by an aversion to what is understood as the governments treatment of mineral-rich areas as mere sites of extractive exploitation", but the critics have yet to form an alternative, coherent mining policy. A number of positions can be derived from the critical discourse, ranging from complete renunciation of the mining industry, to a more modest criticism of certain aspects of the mineral strategy. This fragmented criticism entails poor chances of dialogue between proponents and critics, the authors argue, as it is unclear what is being proposed as an alternative. Three main lines of critique can be distinguished: (i) the prospects for job-creation and local economic growth, where conflicting studies and positions exist, (ii) mining permits granted where they conflict with other national interests, and (iii) the perceived weakness of the Environmental Code in the permitting procedure. Haikola and Anshelm emphasize that both critics and proponents of the current mining policy should take into consideration and evaluate the main lines of argument which constitute the critical discourse.

4.6.1 SAMI RIGHTS AND MINING

When it comes to research on the Sami and mining activities, there is little done using traditional methodological approaches common to the social sciences and economics. Rather, the more common practice uses case law to illustrate the relationship between Sami rights and mining.

With the adoption of Finland's new Mining Act in 2011, there has been considerable research assessing the changes in Sami legal protections. While the old Mining Act from 1965 did not even mention the Sami **(*Koivurova and Petrétei* 2014)**, the new Act contains several provisions

in order to protect Sami rights **(*Muroke* 2015)**, which are applicable specifically within the Sami Homeland area. Moreover, the new Act provides protection for the Sami not only in their Homeland, but also in relation to those mining projects that are outside the Homeland, but are of considerable significance as regards the rights of the Sami as an indigenous people (Section 38 of the Mining Act). The protections given to the Sami in Finland are largely attributed to the active involvement of the Finnish Sami Parliament. Prior to that, as Koivurova and Petrétei point out, there was practically no public conversation about the new Mining Act. As a result, the Sami Parliament has increased its authority and is more outspoken, for example, criticizing the mining authority for the lack of explanation on what criteria it uses to assess the effects on Sami culture (Finnish Sami Parliament statement).

The Minerals Act of Sweden does not contain many provisions to specifically protect Sami rights and interests. The Sami are, however, holders of special rights and therefore their interests have to be taken into account. Reindeer herding and mineral extraction are both regarded as national interests, and as these interests typically compete in mine planning processes, they serve as an obvious basis for conflicts. The so-called *Kallak case* exemplifies this. Kallak is situated in Northern Sweden in the municipality of Jokkmokk, where the mining site is located on lands that have been used by the Sami since time immemorial and play a key role in Sami reindeer herding. The strong opposition of Sami against the activities of the British mining company resulted in clashes between government forces and Sami activists **(*Koivurova et al* 2015)**.

Another significant case in Sweden is the *Rönnbäcken Case*, where exploitation concessions were granted to a private mining company over

a traditional reindeer herding area. The Sami appeal against the decision was rejected by the Government. According to the reasoning, although it is not possible to pursue reindeer herding in the area if mining activities are carried out, the possibilities of Sami to conduct reindeer herding elsewhere are not impeded. This meant that despite both mining and reindeer herding being considered as national interests, mining prevailed over reindeer herding. Sami have managed to bring the case to the United Nations Committee on the Elimination of Racial Discrimination (for more detailed information see ***Labba* 2014 and *Åhrén* 2015**).

5. Good practice examples

One of the differences between the Finnish and Swedish research on sustainable mining is that the Finnish literature tends to more clearly delimit 'good practices' as such, whereas "Swedish" research papers and reports prefer to emphasize positive approaches rather than explicitly define or identify good practices. The majority of good practices in the Finnish research literature cluster along the lines of social license to operate and the reconciliation of livelihoods. Conversely, the Swedish literature focuses on socio-economic impacts and good practices associated with regulatory frameworks.

5.1 INDUSTRY SELF-REGULATION

Nysten-Haarala et al. (2015) conclude that while good national legislation is the best starting point, self-regulation is in itself a good practice as it can facilitate the implementation of sustainable mining practices.

As mentioned previously, in Sweden, research shows that while the term a 'social license to operate' is just beginning to be used more widely, the concept is embodied in the idea of corporate social responsibility. Like in Finland, good practices tend to be of a vague nature emphasizing company behavior that fosters respect for communities, encourages openness and honesty about a project's anticipated impacts, values continuous dialogue with all stakeholders, and ensures that company behavior adds long term value to a community (Adey et al. 2011). Perhaps the most interesting aspect of what is considered good practice in Sweden is this idea of time, specifically, that companies should help educate

people to select long term benefits rather than what may be more tempting immediate offerings. We see this theme of time in the discussion on social license earlier in this report, where research shows that it is the long-established companies in Sweden who have, and manage to maintain, a social license to operate even though the stakeholder engagement strategies of newer firms may be better. In Sweden, this idea of long-term versus short-term colors much of the discussion as to what is 'good' or 'bad' in the mining industry.

In terms of the concept 'social license to operate', good practices in both the Finnish and Swedish literature tend to fall into the following categories: industry communication with stakeholders and company performance towards communities. While most identified good practices focus on building trust between companies and communities, in practice there is little to no guidance on how to implement specific measures. For example, Kokko et al. (2014) mention that a company's commitment to live up to the norms of a local community is an essential relationship-building measure. Nysten et al. (2014) bring in the international aspect by emphasizing the need to apply global standards to local cases, and Jokinen (2015) and Kokko et al. (2014) point out that a critical aspect of trust is to have a respectful attitude, treat local stakeholders equally and to ensure that the same rules apply to each interest group. No one can argue that each of these is not a worthy goal in and of itself and should in fact be a routinized practice of companies; however, the ability to successfully reach these aims is often another matter altogether.

There are many good practice examples given of how the mining industry communicates with stakeholders. These include a company's ability to provide current, truthful, understandable and transparent communication (Kokko et al. 2014; Jartti et al. 2013); ensure all stakeholders have access to the latest information, including mining project plans, and even more importantly, the plans of the other stakeholders (Kokko et al.

2014); that there is open discussion about worst case scenarios (Hast 2013; Jokinen 2015) and finally that companies provide opportunities for local stakeholder participation (Kokko et al. 2014). Two mining companies operating in Kiruna and Pajala that were interviewed both emphasize the importance of understanding local circumstances and achieving good dialogue with community stakeholders (Nysten-Haarala et al. 2015).

Based on interviews with local people, Koivurova et al. (2015) tentatively estimated that both LKAB (in Svappavaara, Kiruna municipality) and Northland (at the time operating in Pajala, but now bankrupt) enjoyed the approval of the affected communities. Both companies placed heavy value on providing information and maintaining dialogue with local stakeholders as the most important aspects of their community relations and both mining companies went beyond legal requirements to maintain and develop good community relations, for instance by having some form of local information office in the affected communities. The companies also appeared to act on community concerns, when feasible.

Looking at the same mines in the context of procedural social sustainability, Suopajärvi et al. (2016) illustrate both the overlaps and differences between this concept and SLO. The authors state that it is important to make clear these concepts have different backgrounds and discussions, and that they represent different angles. For example, while there are overlaps between the two, social sustainability and SLO are not synonymous as social sustainability is a wider concept. Thus, if there is social sustainability then there will also be SLO, but it is not necessarily the case that if there is SLO, there will also be social sustainability since sustainability in general has a longer timeframe than SLO. An example of this can be seen in the following statement, "...participation and

justice are felt if there is continuous open and reliable information of environmental monitoring reported to the local community. And, the mining company is acting transparently and in dialogue with different interest groups so that their concerns are identified and met".

5.2 SOCIAL SUSTAINABILITY : RECONCILIATION OF LIVELIHOODS AND COMMUNITY IDENTITY

As mentioned previously, it is primarily the Finnish research literature that addresses this topic. Good practices include the need for discussing and jointly assessing the impact of mining on other nature users and looking for situations that may benefit the various parties of interest (Jokinen 2015; Kokko et al. 2014). In Sweden, case studies found examples of efforts by mining companies to understand and learn about reindeer husbandry (Koivurova et al. 2015), and agreements by companies with Sami communities on how to mitigate land displacement and other impacts to ensure that reindeer herding can persist despite mining in the area (one measure that has been implemented is GPS-based monitoring of the reindeers' movements, funded by the mining companies).

5.3 SOCIAL SUSTAINABILITY: SOCIO-ECONOMIC IMPACTS, REGIONAL DEVELOPMENT PERSPECTIVES

In Knobblock's (2013) qualitative case studies of several communities affected by two mining companies in Västerbotten County, both companies emphasized taking local economic responsibility by hiring local workers and by contracting local suppliers. In the same study, the current organization of mining employment is also studied. In parallel with the mining industry's transition towards increased outsourcing of former in-house production systems, the increase in social embeddedness

(i.e. formal and informal networks between mining companies and other actors) has contributed to an innovative environment where a number of new businesses have been started in both *core* and *related* mining industry activities. More women have also been included in the field. As the study identifies aspects that may contribute to strengthening the sustainability of peripheral mining communities, Knobblock argues that: "Future development potential is no longer dependent on the resource alone; rather, the long-term experience from mining is used to produce products and services to be sold elsewhere and to be used in other industries." Development, she emphasizes, depends on how successful companies are in adapting to changing global market conditions.

5.4 SOCIAL SUSTAINABILITY: INDUSTRY CULTURE, HEALTH AND SAFETY

There are several examples of good practices in this category that, given the more specific topic, are easier to actually implement. Viinamäki et al. (2015) assert the need for multiphase evaluations of the environmental and social impacts of a mine's operations throughout its life cycle. Salmi et al. (2014) focus on the awareness of a group's unity (work community, organization) and the importance for the leader to acknowledge variations within the group. In the same study, the authors note that a positive orientation in leadership practice is more beneficial to both the productivity of the organization and the well-being of its employees rather than focusing primarily on weaknesses and problems.

5.5 LEGAL FRAMEWORKS AND REGULATORY ASPECTS

Most of the best practices in terms of regulation and legal frameworks have to do with practices driven by specific processes themselves including decision making, assessment processes, licensing but also communication (Jokinen 2015; Kokko et al. 2014; Hast 2013). Another aspect ties into the public participation good practices mentioned previously as Koivurova & Petrétei (2015) point out the need to further encourage indigenous peoples' active contribution in stakeholder consultations. Swedish researchers also find that establishing close relations with important stakeholders at an early stage in the permitting process is important in order to save time and avoid late appeals as is allowing flexibility in terms of technology choices and adjustment periods (Söderholm et al. 2015). The broader context of the 2015 study by Söderholm et al. is the examination of environmental regulation and mining industry competitiveness in Sweden, Finland and Russia, with a focus on the environmental permitting procedure. They found that: "... the environment-competitiveness trade-off is highly dependent on the design and implementation of the regulations, and that there often is scope for achieving positive environmental outcomes without seriously jeopardizing the long-run competitiveness of the mining industry". In addition, environmental regulation in the three countries lacked timeliness and predictability which lead to uncertainty and delays, and the authors proposed that:

- More resources should be allocated to the regulatory authorities,
- More consensus-based interaction between companies and authorities should be implemented in the regulatory process, and
- More standardized procedures for EIA, permit applications and for interpretation of legislation should be introduced.

6. Knowledge gaps

6.1 INDUSTRY SELF-REGULATION

There are a number of knowledge gaps suggested under this heading. Jartti et al. (2013) mentions several including that the variation in the levels of social acceptance throughout the entire life cycle of a mining project should be studied more in depth, how acceptance is correlated with different mining activities (for example land use can be acceptable but the way of treating local people is not), the effects of media (mass media, social media) on social licensing, and how the "preliminary acceptance" of a community affects different mining cases.

Kokko et al. 2014 and Suopajärvi et al. 2015 both stress the need to better understand how a municipality arranges housing, services, traffic, and other technical infrastructure for the duration of a mining project in such a way that they remain functional after the project.

In Sweden, the issue of why newcomers/foreign companies appear to face resistance to a much greater extent than old and established Swedish mining companies and what newcomers can do to address this is a burgeoning topic of research. Finally there are methodologically oriented recommendations that future research should include such as the development of social sustainability methods and indicators specifically tailored to mining, or in other words - how do mining companies get 'a social license to mine'?

6.2 SOCIAL SUSTAINABILITY : RECONCILIATION OF LIVELIHOODS AND COMMUNITY IDENTITY

Finnish researchers have noted that the topic of reconciliation of livelihoods is mainly examined from the viewpoint of mining companies, in particular, what companies can do to ensure their activities. Criticism has arisen however, that reconciliation cannot be developed from just one perspective of land users (Hast 2013) and there should be a more comprehensive emphasis, such as what municipalities can do to reconcile mining development in the area.

For the Sami, one of the most pressing problems is the unsolved legal position of lands. Their legal position would be most clear if they were to enjoy full ownership over the land and or resource rights in regard to conducting their traditional livelihoods (examples can be found from other countries, for example the case of the Nunavut region).

Abrahamsson et al. (2014) state that the gap between the diversity of lifestyles - interpreted as a variety of ways in which people can lead their lives in mining communities, including ethnic as well as social dimensions - and the mining industry is the missing link between studies on the community level and the company level, as the effect on one another might be significant in remote mining communities. There is a definitive lack of research that links attitudes, policies and activities within companies to their impact on the wider community, and vice versa.

In a more general vein, the differences between mining and non-mining communities and regions coupled with the general perception of, and attitude towards, mining in Sweden should be researched more in depth.

6.3 SOCIAL SUSTAINABILITY: SOCIO-ECONOMIC IMPACTS, REGIONAL DEVELOPMENT PERSPECTIVES

There appear to be many targeted areas for future research on the topic of mining's socio-economic impacts. In Finland, more regional level socio-economic impact studies are needed as there is only one institute in the country that conducts these types of analyses.

In Sweden, only a limited number of studies appear to originate from more long-term academic research projects intended to contribute new knowledge or advances in methodology, and therefore, one of the conclusions from the Swedish literature review is that there is a need for additional ex-post econometric studies to better understand the impact of mining on employment and economic growth in North Sweden. Ex-post econometric studies are also needed to supplement ex-ante simulations, which depend heavily on assumptions that recent literature is suggesting rarely hold.

Finally, there is also a need to study the impact of the mining industry not only on non-mining local business, but also with respect to housing infrastructure, and to pinpoint how long term benefits can continue to accrue to mining communities after a mine is depleted and or closed. Here, Wiberg's (2009) work on the regional mineral cluster in Västerbotten offers useful guidelines on how future analyses of similar mineral clusters and their potential growth could be designed.

6.4 INDUSTRY CULTURE, HEALTH AND WELL-BEING

Knowledge gaps in the Finnish research are pointed out in the study from Viinamäki et al. (2015) and include the lack of an assessment that evaluates workers' opportunities to seek employment in mines in other countries as well as in the Barents region; the motivations behind people applying for a job in a mining company; and determining how the well-being and engagement in the different aspects of mine work could be improved, especially in Finland.

There is a need for more gender-oriented research in Finland, especially in the context of better understanding the potential effects on a company's internal structure and workers' well-being. The gender topic is covered to a greater extent in the Swedish literature, which tends to focus on the inherent tension between the company's desire to employ more women in its mines even though there is a dominant 'macho' culture pervasive throughout the mining community as a whole. For the well-being economically and socially of both industry culture and mining communities, the employment of women in the sector is crucial, and therefore there is a real need for more gender-oriented research in both countries.

Salmi et al. (2014) identifies a completely separate yet equally important research gap, namely how the particular work environment intrinsic to mining in the north (i.e. geographically and socially isolated locations, long distances, etc.) is reflected in knowledge workers' (or mining workers' in general) authentic experiences of their well-being at work.

***Abrahamson et al.* (2014)** direct our attention to the lack of studies focusing on work conditions related to social sustainable development in mining; for example, the physical and psychosocial work environment, safety or other company internal organizational aspects.

6.5 LEGAL FRAMEWORKS AND REGULATORY ASPECTS

There are many knowledge gaps identified in this category. In very general terms, several Finnish researchers maintain there is little in the way of long term assessments of legislation reforms and on the impacts of mining in general (Koivurova & Petrétei 2015; Suopajärvi 2013). Questions relating both to the exploitation of minerals and the permitting process for mining operations are relatively unexplored within Swedish legal research[1]. In contrast, there are several legal studies that (partly or wholly) focus on land use and land use conflicts in general (e.g. Darpö 2001; Michanek 1990, 1993) and in relation to specific activities, such as reindeer herding (e.g. Allard 2015, 1996; Bengtsson 2004, 2005); forestry; wind power (Pettersson 2008); the right of public access (Åslund 2008; Bengtsson, 1966; 2004).

On the issue of Social Impact Assessments, there are two gaps mentioned: first, that social impact assessment should not end in the EIA process but should continue throughout the life cycle of a mine (Kokko et al. 2015), and second, that the diversity of local communities in social impact assessments should be much more clearly defined (Suopajärvi 2013).

There are also recommendations for future research that have to do specifically with protections for the Sami within the Sami Homeland. There should be better consultations between the Sami and mining companies as well as clarifications of certain provisions of the Mining Act

1 However, some earlier works can be mentioned, for example Digman (1953); Michanek (1990); Delin (1996, 1977), and more recently Liedholm-Johnson (2010).

(for example upon what criteria the impacts on Sami are assessed during the application process, and a more refined definition of the criteria for appeals). There is also a significant lack of information on the bedrock and possible deposits in the area, which has led to one of the most problematic issues today, which is that if more data could be provided, it would be easier to decide whether it is worth planning any kind of mining-related activities on Sami lands (Koivurova et al. 2015).

There is always an inherent tension between indigenous peoples' rights that must be protected, and at the same time, the needs of the mining industry to expand. More research is required to establish appropriate standards set by legal and social-cultural norms that respect the rights and values of indigenous people so that better co-operation between Sami and mining companies can ensue. To accomplish this, consultation processes need to be more robustly developed, and indigenous participation in decision-making has to be enhanced (see also Koivurova et al. 2015). The application of the principle of free, prior and informed consent would also be an important step forward (see also Nygaard 2016, p. 19; Labba 2014, p. 95-96).

In Sweden, both the state's Mineral Strategy and the Minerals Act have been criticized for the legislation being too liberal. Not only is it recommended that the legislation in general be tightened up, but in the case of the Swedish Sami reindeer herders, they have complained about the Act not complying with the international standards in the case of mining activities on indigenous peoples' lands (Labba 2014, p. 95-96). It is also suggested that the relationship between tougher environmental requirements (beyond formal legal rules) and competitiveness (Söderholm et al. 2015) be studied more in depth.

One observation of a research gap that has not explicitly been identified in either the Finnish or Swedish literature is that no research appears to exist on the adoption or implementation of industry standards/

certification schemes. While Finland and Sweden are both known to have a well-functioning regulatory system for mining projects, there is no mention in the literature whether implementing international management standards that incorporate accountability mechanisms and reporting requirements enhance social acceptance and environmental stewardship.

Conclusions 7.

If one could parse out the main conclusion of the report, it would be that Finland and Sweden's approaches to social science research in sustainable mining are complementary rather than identical. Although the two countries are very similar on many levels – culturally, in terms of governance, overall value systems, etc. – they have somewhat different research needs. The larger research themes (industry self-regulation, three different strands of social sustainability, and legal frameworks and regulatory aspects) are, however, applicable to both countries. It is the more specific topics under these themes which differ.

For example, under the *Industry self-regulation theme*, Swedish research emphasizes the success of management systems in terms of stakeholder engagement strategies and the need to better systematize these strategies. Sweden also has more examples of one-industry towns and has done a good deal of research on the social after-effects once a company leaves and the mine is closed. In Finland, the approach to stakeholders is quite different in that a company's management and organizational structure is not analyzed. Rather, the focus is the other way around - community attitudes toward mining companies and a bottom-up approach to stakeholder engagement are the approaches that receive attention. The *Industry self-regulation theme* lends itself to this dichotomy where we see on one hand a more business-based approach from Sweden and on the other hand a more community participatory approach from Finland.

There are three social sustainability themes individually identified in this synthesis report and yet the specific topics under each rarely are seen in both the Finnish and Swedish literature. Under *reconciliation of livelihoods and community identity*, research in Finland mainly looks at the former and in Sweden the research focuses on the latter. There is one

exception in the Finnish literature where Suopajärvi et al. 2015 looks at the procedural and contextual aspects of social sustainability. The *socio-economic impacts and regional development perspectives* theme is clearly dominated by Swedish researchers as there is very little attention paid in Finland to this topic. *Industry culture, health and well-being* again shows the differing research orientations as in Finland, it is the overall well-being of knowledge workers that garners the most attention. The Swedish perspective centers on better understanding gender, identity and tradition within mining companies.

The last theme, *Legal frameworks and regulatory aspects*, is more dominated by Finnish researchers than Swedish ones. Again, the individual topics do not overlap. A legal outlook pervades the research of this theme in Finland; for example, topics of interest include mining legislation and reform, impact assessment and Sami rights. In Sweden, there is some legal analysis but more of an interest in better designed and implemented regulations. For recently published in-depth research on Sami rights in the Nordic countries, but not necessarily in the specific context of mining, see for instance Allard and Funderud Skogvang (2015) and Allard (2015).

Interestingly, in some of the good practice topics, there appears to be more overlap as is the case in the *Industry self-regulation* theme. In the three social sustainability themes, more good practices in Finland have been identified in the first and third themes (*reconciliation of livelihoods and community identity* and *industry culture, health and safety*, respectively) while Sweden dominates the second (*socio-economic impacts and regional development perspectives*). The number of good practices are somewhat evenly shared in the *Legal frameworks and regulatory aspects*

theme albeit distributed under different topics. One of the most notable differences between the two countries in the area of good practice is that Finnish literature tends to provide good practice examples whereas Swedish literature emphasizes positive approaches rather than specific examples.

Finally, when it comes to knowledge gaps, these are relatively equally distributed with the exception of the *socio-economic impacts and regional development perspectives* theme (all Swedish). There are no easily identifiable common categories with which to order the knowledge gaps so a few examples are provided here instead. Looking at social acceptance, it is suggested that the different levels of acceptance be studied, the importance of mining history and its effect on SLO in Sweden be clarified, and more rigorous methodological approaches and the development of indicators be created to determine how mining companies get a social license to mine. In Finland, reconciliation of livelihoods is mainly examined from the viewpoint of companies, but it is suggested that the roles of other actors should also be studied, i.e. affected municipalities and land use conflicts with the Sami are two major topics. In Sweden, there is a desire to research the links between attitudes, policies and activities within companies to the community. In the remaining themes, for socio-economic impacts, there is a need to identify how a community can benefit over the long-term, even after a mine is depleted and closed; well-being for both mine workers and other related knowledge workers is highlighted; and there are many recommendations in the regulatory theme ranging from better assessments of legislative reforms to increasing protections for the Sami.

If there is one consistent message throughout the literature, it is that the importance of understanding the role of communities in mining projects is growing, both for Finland and Sweden. Although mining is cyclical in nature, other changes occurring in the northern reaches of

both countries seem to be on a rather linear trajectory upward – a warmer environment and more industry to name two of them. It is only a matter of time before interest grows again in mining activities in this region, and in the interest of ensuring truly sustainable development, tailoring the future research needs for both Finland and Sweden will be essential.

References

Abrahamsson, L., Segerstedt, E., Nygren, M., Johansson, J., Johansson, B., Edman, I. & Åkerlund, A. (2014). Mining and Sustainable Development: Gender, Diversity and Work Conditions in Mining. Luleå tekniska universitet, Luleå.

Abrahamsson, L & Johansson, J. (2006). From grounded skills to sky qualifications: A study of workers creating and recreating qualifications, identity and gender at an under-ground iron ore mine in Sweden. Journal of Industrial Relations, 48(5), 657-676.

Abrahamsson, L., Lööw, J., Nygren, M., & Segerstedt, E. (2015). How to Get a Social Licence to Mine. Artikeln har presenterats vid International Future Mining Conference, Sydney, Australien.

Adey, EA, Shail, RK, Wall, F, Varul, M, Whitbread-Abrutat, P, Baciu, C, Ejdemo, T, Lovric, I & Udachin, V.(2011). Corporate social responsibility within the mining industry: case studies from across Europe and Russia. In: Proceedings of the Aachen International Mining Symposia (AIMS) : 5th International Conference – Sustainable Development in the Minerals Industry (SDIMI 2011), Aachen, 14-17 June 2011. Aachen University, Aachen, s. 153-170.

Allard, C & Funderud Skogvang, S (Eds.) (2015). Indigenous Rights in Scandinavia – Autonomous Sami Law. Ashgate Publishing.

Allard, C. (2006). Two Sides of the Coin: Rights and Duties. The Interface between Environmental Law and Saami Law Based on a Comparison with Aoteoaroa/New Zealand and Canada. Doctoral Dissertation, Luleå University of Technology.

Allard, C. (2015). Renskötselrätt i nordisk belysning. Makadam förlag, Göteborg.

Andersson, E. (2012). Malmens manliga mysterium: En interaktiv studie on kön och tradition i modernt gruvarbete (Doctoral dissertation).

Bengtsson, B. (1966). Allemansrätt och markägarskydd, andra upplagan. P.A. Norstedt & Söners förlag, Stockholm.

Bengtsson, B. (2004). Allemansrätten – Vad säger lagen? Naturvårdsverket, Stockholm.

Bentsson, B. (2005). Vem får jaga och fiska? In SOU 2005:17: Samernas jakt- och fiskerätt: Rätt till jakt och fiske i lappmarkerna och på renbetesfjällen, p. 11-45, Liber, Stockholm

Bäckström, L. (2015). Svensk gruvrätt: En rättsvetenskaplig studie rörande förutsättningarna för utvinning av mineral. Luleå tekniska universitet. Doctoral thesis / Luleå University of Technology.

Darpö, J. (2001). Eftertanke och förutseende – En rättsvetenskaplig studie om ansvar och skyldigheter kring förorenade områden. Doktorsavhandling, Juridiska fakulteten, Uppsala universitet, Sverige.

Delin, L. (1977). Gruvlagstiftningen. P.A. Norstedt & Söners förlag, Stockholm.

Delin, L. (1996). Minerallagen med kontinentalsockellagen. Norstedts Juridik AB, Stockholm.

Digman, H. (1953). Svensk gruvrätt. P.A. Norstedt & Söners förlag, Stockholm.

Ejdemo, T. (2013). Mineral development and regional employment effects in northern Sweden: a scenario-based assessment. Mineral Economics, vol 25, nr 2-3, s. 55-63., 10.1007/s13563-012-0023-z

Ejdemo, T. & Söderholm, P. (2011). Mining investment and regional development: a scenario-based assessment for Northern Sweden. Resources Policy, vol 26, nr 1, s. 14-21, 10.1016/j.resourpol.2010.08.008

Funderud Skogvang, S. (2014). Extractive Industries in the North – What about Environmental Law and Indigenous Peoples' Rights? Nordisk Miljörättslig Tidskrift/Nordic Environmental Law Journal (ed. Michanek, Gabriel) 1 (2014), pp. 13-19.

Haikola, S & Anshelm, J. (2015). Mineral policy at a crossroads? Critical reflections on the challenges with expanding Sweden's mining sector. The Extractive Industries and Society. In press: http://dx.doi.org/10.1016/j.exis.2016.01.008

Hast, S. (2013). Elinkeinojen yhteensovittamisen haasteet ja mahdollisuudet. Kaivokset, maankäyttö ja paikalliset yhteisö. DILACOMI- loppuseminaari 27.9.2013. http://www.ulapland.fi/loader.aspx?id=25f66fe4-adff-4ef0-9c99-f0de9fcf7cbf

Hojem, P. (2014). Making Mining Sustainable: Overview of Private and Public Responses. Published by Lulea University of Technology.

Jakobsson, M. (2008). Preferences about present situation and future expectations in Pajala and Kolari. Luleå University of Technology, Department of Human Work Sciences.

Jakobsson, M. & Segerstedt, E. (2014). Mot en gruvlig framtid?: Malmfältare om stadsomvandlingen i Kiruna och Gällivare. Luleå tekniska universitet, Luleå. Rapportserie Attract, nr 2014:05

Jartti, T., Rantala, E. & Litmanen, T. (2014). Sosiaalisen toimiluvan ehdot ja rajat. Uudenmaan, Pohjois-Karjalan, Kainuun ja Lapin maakuntien asukkaiden näkemykset kaivannaistoiminnan hyväksyttävyydestä.

Jokinen, M. (2015). Tourism industry meets mining industry. Win-win situation or unhappy marriage? http://www.metla.fi/hanke/7563/pdf/esitys_08042014_IAIA14_Jokinen.pdf

Kaivostoiminnan yhteiskuntavastuu 2014. Suomessa toimivien kaivosten ja malminetsijöiden yhteiskuntavastuuraportti (2015) Kestävän kaivostoiminnan verkosto. http://www.kaivosvastuu.fi/wp-content/uploads/2015/09/Korjattu_yhteiskuntavastuuraportti_verkko_kevyt_22-09-15.pdf (accessed 26.2.2016).

Knobblock, E. & Pettersson, Ö. (2010). Restructuring and risk-reduction in mining: employment implications for northern Sweden. Fennia, 188(1), 61-75.

Knobblock, E. (2013). Organizational changes and employment shifts in the mining industry: Toward a new understanding of resource-based economies in peripheral areas. Journal of Rural and Community Development, 8(1), 125-144.

Knobblock, E. (2013). Corporate Social Responsibility (CSR) in the welfare state: Experiences from mining communities in Sweden. In: Lundmark, L. and Sandström, C. (ed.) Natural resources and regional development theory (pp. 158-175). Umeå: Institutionen för geografi och ekonomisk historia, Umeå universitet. GERUM Kulturgeografisk arbetsrapport.

Koivurova, T., Buanes, A., Riabova, L., Didyk, V., Ejdemo, T., A Poelzer, G., Taavo, P. & Lesser, P. 2015, 'Social license to operate': a relevant term in Northern European mining? Polar Geography, vol 38, nr 3, s. 194-227., 10.1080/1088937X.2015.1056859

Koivurova, T., Masloboev, V., Hossain, K., Nygaard, V., Petrétei, A. & Vinogradova, S. (2015). Legal Protection of Sami Traditional Livelihoods from the Adverse Impacts of Mining: A Comparison of the Level of Protection Enjoyed by Sami in Their Four Home States. Arctic Review on Law and Politics, Vol. 6, No. 1 (2015), pp. 11-51.

Koivurova, T., Masloboev, V., Petrétei, A., Nygaard, V. & Hossain, K. (2014). Transboundary EIA in the Barents region. Nordic Environmental Law Journal 3. 45-62.

Koivurova, T. & Petrétei, A. (2014). Enacting a New Mining Act in Finland – How were Sami Rights and Interests Taken into Account? Nordisk Miljörättslig Tidskrift/Nordic Environmental Law Journal (ed. Michanek, Gabriel) 1 (2014), pp. 119-133.

Kokko, K., Buanes, A., Koivurova, T., Masloboev, V. & Pettersson, M. (2015) Sustainable mining, local communities and environmental regulation. Barents Studies 2 (1). 50-81.

Kokko, K., Oksanen, A., Hast, S., Heikkinen, H. I., Hentilä, H-L., Jokinen, M., Komu, T., Kunnari, M., Lépy, É., Soudunsaari, L., Suikkanen, A. & Suopajärvi, L. (2014). Sound Mining in the North: A Guide to Environmental Regulation and Best Practices Supporting Social Sustainability. http://lauda.ulapland.fi/bitstream/handle/10024/59503/Sound%20minig%20in%20the%20North.pdf?sequence=2

Laasanen, J. (2010). Soklin kaivoksen vaikutukset Savukosken kuntaan. Helsingin yliopisto Ruralia Instituutti. Raportteja 56. http://www.helsinki.fi/ruralia/julkaisut/pdf/Raportteja56.pdf

Labba, M. K. (2014). Mineral Activities on Sami Reindeer Grazing Land in Sweden. Nordisk Miljörättslig Tidskrift/Nordic Environmental Law Journal (ed. Michanek, Gabriel) 1 (2014), pp. 93-98.

Laukkonen, J. & Törmä, H. (2014). Suomen kaivosalan vaikuttavuuden kehitys ja haasteet vuosina 2010–2020. Helsingin yliopisto Ruralia Instituutti. Raportteja 136. http://www.helsinki.fi/ruralia/julkaisut/pdf/Raportteja136.pdf

Liedholm-Johnson, E. (2010). Mineral Rights – Legal Systems Governing Exploration and Exploitation. Doctoral Thesis (KTH), Stockholm.

Lind, T. (2009). Back to the Basics? Modelling socio-economic impacts of new mines in the interior of Västerbotten, Sweden. Master Thesis in Human Geography, Department of Social and Economic Geography, Umeå University.

Michanek, G. (1990). Energirätt – En undersökning från mark- och miljörättslig utgångspunkt med särskild inriktning på frågor om energihushållning. Doktorsavhandling, Juridiska fakulteten, Uppsala universitet, Uppsala, Iustus förlag AB, Uppsala.

Michanek, G. (1993). Svensk Miljörätt, Iustus Förlag AB, Uppsala, Sweden.

Muroke, H. (2015). Perusoikeudet malminetsinnässä", Master's Thesis, University of Lapland. Can be accessed at: https://lauda.ulapland.fi/bitstream/handle/10024/62197/Muroke.Hans.pdf?sequence=2

Nilsson, B. (2010). Ideology, environment and forced relocation: Kiruna - a town on the move. European Urban and Regional Studies, 17(4), 433-442. doi:10.1177/0969776410369045

Nygaard, V. (2016). Do indigenous interests have a say in planning of new mining projects? Experiences from Finnmark, Norway. The Extractive Industries and Society 3 (2016), pp. 17-24.

Nysten-Haarala, S., Klyuchnikova, E. & Helenius, H. (2015). Law and self-regulation: Substitutes or complements in gaining social acceptance? Resources Policy, vol 45, s. 52–64., 10.1016/j.resourpol.2015.02.008

Pettersson, M. (2008). Wind power development and the function of law. A comparative study of legal rules related to the planning, installation and operation of windmills. Doctoral Dissertation, Luleå University of Technology.

Pettersson, M., Oksanen, A., Mingaleva, T., Petrov, V. & Masloboev. V (2015). License to Mine: A Comparison of the Scope of the Environmental Assessment in Sweden, Finland and Russia. Natural Resources, vol 6, 6, s. 237-255., 10.4236/nr.2015.64022

Poelzer, G. (2015). A Stake in Mining: Participatory Elements in Swedish Mine Development. Northern Review, vol 39, s. 39-52.

Posion kehitysyhtiö Oy (2015). EAKR-projektin loppuraportti. Kaivosteollisuuden synergiatarpeet ja yhteistyömahdollisuudet Posiolla.

Ranängen, H. & Zobel, T. (2014). Exploring the path from management systems to stakeholder management in Swedish mining industry. Journal of Cleaner Production 84, 128-141.

Ranängen, H. (2015a). Advancing CSR in the mining industry: A stakeholder and management system approach. Doctoral thesis / Luleå University of Technology.

Ranängen, H. (2015b). Stakeholder management in reality: Moving from conceptual frameworks to operational strategies and interactions. Sustainable Production and Consumption 3, 21-33.

Ravna, Ø (2014). The Fulfillment of Norway's International Legal Obligations to the Sami – Assessed by the Protection of Rights to Lands, Waters and natural Resources.. International Journal on Minority and Group Rights 21 (2014), 325-7.

Salmi, I., Perttula, J. & Syväjärvi, A. (2014). Positive leadership and experiences explaining workers' well-being in knowledge-intensive organization. The Polar Journal. Vol. 4, Iss. 1, 52-68. http://dx.doi.org/10.1080/2154896X.2014.913929

Sitra (2014). Kaivosalan tutkimushankkeet kartoitettiin tietokantaan. http://www.sitra.fi/artikkelit/vastuullinen-kaivostoiminta/kaivosalan-tutkimushankkeet-kartoitettiin-tietokantaan (accessed 26.2.2016).

Sitra (2015). Kaivosalalle vuodessa lähes 30 uutta tutkimushanketta. http://www.sitra.fi/artikkelit/vastuullinen-kaivostoiminta/kaivosalalle-vuodessa-lahes-30-uutta-tutkimushanketta (accessed 26.2.2016).

Sjöholm, J. (2016). Heritagisation, re-heritagisation and de-heritagisation of built environments: The urban transformation of Kiruna, Sweden. Doctoral thesis / Luleå University of Technology.

Suopajärvi, L. (2013). Social impact assessment in mining projects in Northern Finland: Comparing practice to theory. Environmental Impact assessment Review, Vol. 42. 25-30.

Suopajärvi, L. (2015). The right to mine? Discourse analysis of social impact assessment on mining in Finnish Lapland in the 2000s. Barents studies 1 (3). 36-54.

Suopajärvi, L., Poelzer G.A., Ejdemo, T., Klyuchnikova, E., Korchak, E. & Nygaard, V. (2016). Social sustainability in Northern mining communities. A Study of the European North and Northwest Russia. Final version published online: 17-DEC-2015 Full bibliographic details: Resources Policy (2016), pp. 61-68 DOI information: 10.1016/j.resourpol.2015.11.004

Söderholm, K., Söderholm, P., Helenius, H., Pettersson, M., Wiklund, R., Masloboev, V., Mingaleva, T. & Patrov, V. (2015). Environmental Regulation and Competitiveness in the Mining Industry: Permitting Processes in Finland, Sweden and Russia. Resources Policy, vol 43, s. 130–142, 10.1016/j.resourpol.2014.11.008

Sörensson, R. (2003). Effektstudie av gruvetableringar i Lycksele och Storumans arbetsmarknadsregioner. CERUM Report 11:2003, Centrum för regionalvetenskap, Umeå Universitet.

Söderholm, P. & Svahn, N. (2015). Mining, regional development and benefit-sharing in developed countries. Resources Policy 45, pp. 78-91.

Tano, S., Pettersson, Ö., & Stjernström, O. (2016). Labour income effects of the recent ”mining boom” in northern Sweden. Resource Policy 49, 31-40.

Tarras-Wahlberg, N.H. (2014). Social license to mine in Sweden: do companies go the extra mile to gain community acceptance? Mineral Economics, vol 27: 143-147.

Tillväxtanalys. (2010). Malmfälten under förändring: En rapport om arbetskraftsförsörjning och utvecklingsmöjligheter i Gällivare, Kiruna och Pajala. Rapport 2001:05, Myndigheten för tillväxtpolitiska utvärderingar och analyser, Östersund.

Törmä, H., Kinnunen, J., Määttä, S. & Zimoch, U. (2013). Sodankylän Kevitsan kaivoksen alue- ja kunnallistaloudelliset vaikutukset. Helsingin yliopisto Ruralia-instituutti. Raportteja 102. http://www.helsinki.fi/ruralia/julkaisut/pdf/Raportteja102.pdf

Törmä, H. & Reini, K. (2009a). Suomen kaivosalan aluetaloudelliset vaikutukset elinkeinorakenteeseen ja työllisyyteen. Helsingin yliopisto Ruralia-instituutti. Raportteja 37. http://www.helsinki.fi/ruralia/julkaisut/pdf/Raportteja37.pdf

Törmä, H. & Reini, K. (2009b). Pajala-Kolarin ja Soklin kaivoshankkeisiin liittyvien rautatie- ja tieinvestointien ja Kemin satamainvestointien aluetaloudelliset vaikutukset. Helsingin yliopisto Ruralia-instituutti. Raportteja 38. http://www.helsinki.fi/ruralia/julkaisut/pdf/Raportteja38.pdf

Törmä, H. & Zawalinska, K. (2007). Kevitsan nikkeli-kuparikaivoshankkeen aluetaloudelliset vaikutukset. Helsingin yliopisto Ruralia-instituutti. Raportteja 16. http://www.helsinki.fi/ruralia/julkaisut/pdf/Raportteja16.pdf

Törmä, H., Kujala, S. & Kinnunen, J. (2015). The employment and population impacts of the boom and bust of Talvivaara mine in the context of severe environmental accidents – a CGE evaluation. Resources Policy 46, pp. 127-138.

Työkalupakki: kaivostoiminta (2015). Kestävän kaivostoiminnan verkosto. http://www.kaivosvastuu.fi/handbook/ (accessed 26.2.2016).

University of Lapland (2015). Governing adaptive change towards sustainable economy in the Arctic (GovAda), 1.9.2014-31.8.2018. https://www.ulapland.fi/InEnglish/Units/Faculty-of-Law/Research/Research-Projects/GovAda. (accessed 29.2.2016).

Viinamäki, L., Kilpiäinen, S. & Ainonen, M. (2015). Conclusions and challenge for the mining industry in the local community. In Viinamäki ed. (2015) Socio-economic Challenges in the Mining Industry – Four Cases from the Barents Region. Publications Of Lapland UAS, Publication series B. Reports 16/2015. https://www.theseus.fi/bitstream/handle/10024/97897/OK%20%20engl.%20KAIVOSJULKAISUN%20FINAALI%20.pdf?sequence=1>

Westin, L. (2011). Hållbar regional utveckling i Västerbotten. En sammanfattning av resultat från ACANALYS. Centrum för regionalvetenskap (CERUM), Umeå universitet.

Wiberg, U. (2009). Förutsättningar för hållbar tillväxt i gruv- och mineralsektorn. Rapport 0004, Tillväxtverket, Stockholm.

Åhrén, M. (2014). International human Rights Law Relevant to Natural Resource Extraction in Indigenous Territories – An Overview. Nordisk Miljörättslig Tidskrift/Nordic Environmental Law Journal (ed. Michanek, Gabriel) 1 (2014), pp. 21-37.

Åhrén, M. (2015). To What Extent Can Indigenous Territories be Expropriated?. Indigenous Rights in Scandinavia – Autonomous Sami Law (eds. Allard, Christina and Skogvang, Susann Funderud). Ashgate Publishing (2015), pp. 173-187.

Åhrén, M. (2016). Indigenous Peoples' Status in the International Legal System. Oxford University Press.

Åslund, Å. (2008). Allemansrätten och markutnyttjande – studier av ett rättsinstitut. Doktorsavhandling, Institutionen för ekonomisk och industriell utveckling. Linköpings universitet, Linköping.

LEGAL INSTRUMENTS AND REPORTS

Anaya, James, Report of the Special Rapporteur on the rights of indigenous peoples, "Extractive industries operating within or near indigenous territories", A/HRC/18/35 (2011). Available at: http://www.ohchr.org/Documents/Issues/IPeoples/SR/A-HRC-18-35_en.pdf

Anaya, James, Report of the Special Rapporteur on the rights of indigenous peoples, Addendum, "The situation of the Sami people in the Sápmi region of Norway, Sweden and Finland", A/HRC/18/35/Add.2 (2011). Available at: http://unsr.jamesanaya.org/docs/countries/2011-report-sapmi-a-hrc-18-35-add2_en.pdf

Anaya, James, Report of the Special Rapporteur on the rights of indigenous peoples, “Extractive Industries and indigenous peoples”, A/HRC/24/41 (2013). Available at: http://unsr.jamesanaya.org/study/report-a-hrc-24-41-extractive-industries-and-indigenous-peoples-report-of-the-special-rapporteur-on-the-rights-of-indigenous-peoples

Finnish Sami Parliament statement, 584/D.a.9/2013.

Frazer Institute Annual Survey of Mining Companies, available at: https://www.fraserinstitute.org/sites/default/files/survey-of-mining-companies-2014.pdf

Mineral Guide (Norway), The Sami Parliament’s mineral guide for exploration work and operations relating to mineral resources

Mineral Strategy of Swedish Sami Parliament, https://www.sametinget.se/mining

Minerals Act of Norway: Act of 19 June 2009 No. 101 relating to the acquisition and extraction of mineral resources (the Minerals Act).

Minerals Act of Sweden: Minerals Act, 1991:45.

Mining Act of Finland, 627/2011

Sami Parliamentary Council statement, SPR 2014-09-11. Press release about the statement: https://www.sametinget.se/78209

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Sustainable mining in the Northernmost Europe
– lessons learned and practices developed

SYNTHESIS REPORT

SUSTAINABLE MINING – NORDIC ADVANCED KNOWLEDGE SYNTHESIS GUIDEBOOK
GOOD PRACTISES AND KNOWLEDGE GAPS

by:
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