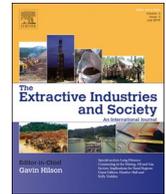




Contents lists available at ScienceDirect

The Extractive Industries and Society

journal homepage: www.elsevier.com/locate/exis

Review article

Diversity of livelihoods and social sustainability in established mining communities

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ARTICLE INFO

Keywords:

Social sustainability
Mining
Gender
Diversity
Community planning

ABSTRACT

The challenges for any community that seeks to maintain a healthy and thriving social life around an operating mine have been considered at some length in research, but the picture is still far from complete. In order to pinpoint some of the gaps in research, the literature on social sustainability as applied to established mining communities in developed countries is here reviewed, and the general understanding of the social sustainability of such communities is touched on. Diversity of livelihoods is explored as an analytical lens which can be used to approach social sustainability challenges without essentializing the preferences of social groups. Extensive literature searches with keywords such as *mining, work, gender, organization, social, sustainability, community, town, area, cohesion* and *inclusion* were conducted. The results of our review show a research gap between studies of mining companies and studies of wider mining communities. We conclude that considering diversity of livelihoods can be a productive analytical tool when approaching aspects of social sustainability such as social cohesion and inclusion, gender equality, managed migration, demographics, and housing infrastructure. Continued research is recommended to further bridge the gap between studies of mining companies and studies of mining communities from the perspective of social sustainability.

1. Introduction

This article discusses a range of social challenges in established mining communities and reviews how these issues have been treated in the literature. On one hand, social sustainability issues are regarded as important by the mining industry (at least rhetorically), and local communities, and by researchers and practitioners. Yet there are distinct academic traditions in approaching these issues, as they tend to be divided into analyses either from the perspective of the company or the community; potentially fruitful connections between the two approaches are largely absent. In addition, many analyses of social life around an operating mine bring up the issues specific to remote rural areas with no substantive communities to speak of, while established mining communities are not analyzed specifically. The reality of urban communities in sparsely populated areas influenced by mining operations is in fact far more complex than the current approaches present in modern research can encompass. Some of the discrepancies between the rhetoric and praxis of company-community interactions were described systematically in the international report *Mining, Minerals and Sustainable Development (MMSD)* project from 2002, and the results of this important document reached many mining companies and

communities together with some of the suggested solutions.

In this article, we identify and describe the current situation when it comes to social sustainability challenges for established mining communities in the aftermath of the *MMSD* report; review the analytical perspectives within the field; and contribute to the theoretical development on social sustainability analysis for those types of communities. We suggest and test the hypothesis that using diversity of livelihoods as an analytical lens turned on social sustainability would allow the focus to be placed on the interests of different social groups in those communities without essentializing their needs and interests. These perspectives are present – indeed they are often pronounced – in discussions on social sustainability; however, one of the central aims of this article is to describe the two sides more fully and bring them together. We hope to connect the potential for a community to co-exist with a running mine, and also enhance established mining communities at the local and regional level where social sustainability is realized during the mine's operational lifetime.

For the purpose of this article the term “mining” focuses mainly on mining iron ore, metals and coal. It does not include oil or natural gas production, sand mining or quarrying. This apparent limitation is a deliberate choice. The article focuses on developed countries listed in

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<https://doi.org/10.1016/j.exis.2019.03.008>

Received 6 August 2018; Received in revised form 15 March 2019; Accepted 15 March 2019

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more detail in the Methods section. The social context of established mining communities is limited to those comparable to iron ore mining in Sweden (the authors' special area of expertise). The Swedish context can be of special interest because of the nature of the established communities around the mines, large-scale production, and the fact that indigenous people live in the area around several mines – the major community transformations happening in Swedish mining communities such as Kiruna and Gällivare is also of considerable interest.

Challenges for mining communities and companies

Minerals are essential for human welfare and social life; their extraction is associated with both opportunities and challenges. Long-term challenges include environmental issues and the fact that mining operations must not endanger the health and well-being of its workers and the community's citizens. One often-mentioned aim is that after mining activities have ceased, there should be as few footprints as possible in nature and the landscape and in the life of the people living in the area. Yet this aim is complicated by an equally common wish that *some* footprints should nevertheless remain, namely a useful infrastructure and a thriving community. This tension becomes obvious when we discuss the complexities of established mining communities.

By “established mining communities” we mean communities that co-exist with ongoing mines and mining companies. In Sweden these communities are often rural and small or mid-sized towns. The center of Gällivare municipality, a mining community in northern Sweden, can serve as a relevant empirical example here. It has been regarded by researchers in subtly different ways, as: a rural-like environment (Nordström, 2010); an urban center in a rural area (Ceccato and Persson, 2002); or an urban settlement in a rural region (Nilsson, 2011). In this article Gällivare – and by implication similar established mining communities elsewhere – is regarded as a sparsely populated urban environment in a rural area, as it was regarded for instance in Johansson's study (Johansson et al., 2016). Such towns face many practical challenges that provide both possibilities and obstacles to supporting socially sustainable development, challenges that they in varying degrees share with mining communities in countries such as Norway, Finland, Australia, and Canada. Many of these communities have always been, and indeed still are, at the mercy of global market fluctuations in the mining, steel, and forestry sectors. They are situated in districts that are home to highly valued natural areas, major tourist attractions, and mixed populations where indigenous peoples are an important presence; in some cases these areas are sources for important and difficult discussions and debates, and sometimes even overt conflicts. Examples of deep-rooted and persistent problems in these communities are: low education levels (especially among men); depopulation (as women and young people move away); economic stagnation; downsized welfare services; and a low level of activity in other sectors (trade, housing, communication, and infrastructure); as well as a gender-segregated labor market with a low degree of differentiation. Those two last aspects distinguish industrial communities from small rural communities. In addition, these areas are often characterized by a social construction of rural citizens (especially men) as “old-fashioned” and culturally conservative. Interestingly, these social constructions are not always imposed from the outside – sometimes they also form part of the regions' own self-image and can perhaps be explained by the complex challenges that the communities have for a long time faced.

The problems outlined above are undoubtedly substantial, but some of them, however, are offset by periods of more positive trends such as a low level of unemployment, new investments in housing and infrastructure, and growing entrepreneurial activity. A lot of those challenges are relevant for rural industrial communities, but some are specific to mining communities. During periods when mining is booming the problems change character and become related to, for example, lack of housing and infrastructure, and the difficulty in recruiting new employees with the right skills, both for the mining

companies and other ancillary businesses and welfare services such as health care. Other major challenges relate to the environment; more specifically, how to balance the mining companies' need for efficient licensing with environmental concerns? Moreover, even if we can see an emerging diversity of livelihoods, the recent mining boom mainly led to an increase in activity in businesses and industries that have long been dominated by men (and hence have a social milieu with a strong focus on men and masculinity), and the risk is that the future will continue to present different versions of the same social problems already seen, especially if the ongoing recession that the global mining industry is currently experiencing continues unabated.

The recession has created obvious difficulties for mining companies. Competition is getting fiercer, the Chinese “engine” has slowed down its high demand for ores and metals, and ore prices have dropped. Many mining companies have also experienced rising production and energy costs. The stronger companies can still afford to invest for the future, but the weaker will inevitably be drained of their capital and in the ultimate scenario may face extinction. A recent Swedish example of this is Northland Resources' bankruptcy, with the closure of the newly established iron ore mine in Pajala in the north of Sweden in 2014–15 – the consequences for such a small and vulnerable rural community were predictably negative.

A general effect of the recession is that all mining companies are put under increasing rationalization pressure; this pushes the development and implementation of new technologies as well as safe, flexible, lean, and effective organizations. “Digital mining”, “mining on demand”, and “remote mining” are radical contemporary ideas that many mining companies are exploring today, together with the vision of “zero entry”, i.e. taking people away altogether from dangerous areas underground (see for example Future Mining Conference, November 2015). In fact, automation and remote control from distant operation centers have been used for more than a decade (Bassan et al., 2008; Fisher and Schnittger, 2012). Today we can in several mines see how this type of technology is being further developed, with, for example, real-time tracking of machines and people, drones, robotics, AI, intelligent embedded sensors, and mobile IT-tools – an extraordinary internet of things and services in an unlikely setting (Sennersten et al. 2015; Lööv et al., 2018).

Needless to say that the implementation and realization of these new technologies and organizational forms are neither simple nor without resistance: they challenge old behaviors and attitudes of both management and workers in the mining company as well as in the community at large. The workplace culture of the mine, with its very particular notion of masculinity, can lag far behind the development in technology and its qualification demands (Abrahamsson and Johansson, 2006). Yet more and more, mining companies do see a need for a change of the old culture in order to create safe and productive conditions for mining in the future (Andersson et al., 2013).

A wider societal aspect of technological development and the trend towards lean organizations is the decreasing proportion of unskilled labor required; it seems certain that there will be fewer employees in the mining companies but with higher wages and higher education levels. Perhaps the mining company's position as *The* employer in the community will indeed be reduced, but this can also have other more positive effects, such as better health and safety, more diversified working life, higher general education levels, and more cultural diversity in the community – all of which can be seen as important elements of socially sustainable development. Mining companies are openly discussing talent and skills development, and often mention the challenge of recruiting skilled labor and expertise to mines that are far away from larger cities. One interesting – and often problematic – aspect of this is the growing use of contractors and fly-in-fly-out (FIFO) arrangements. Swedish mining companies usually want to avoid a FIFO situation because, as Langdon et al. shows (2016), FIFO can create socially unstable local societies, while too many contractors might lead to a complex and unpredictable situation when it comes to safety,

workplace cultures, and organizational learning. Where FIFO does predominate it places the mining industry in urgent need of infrastructure upgrades (social, health, transport, energy, etc.), and novel strategies for work organization, health, and safety measures to accommodate FIFO workers and contractors. Despite these obvious disadvantages, using contractors may contribute to a more diversified and innovative business climate – both inside the mining industry itself and in the local established mining communities.

2. Methods

Our data mainly comes from closely reviewing articles in international scientific journals, but we also reviewed industry research reports (national as well as international), and some conference papers. For the literature overview, a broad search of academic databases was conducted using keywords, alongside a pre-reading of documents such as the *MMSD* report from 2002. The report identified challenges to the sustainability of communities, pinpointing, among various things, community coherence, equity, diversity, physical, and human resources; furthermore, suggestions for improvements were made regarding community development plans, company-community engagement, and impact assessment. The literature search for this article is limited to studies from 2002 and onwards: the time period when the *MMSD* report has been known about and circulating among researchers as well as mining companies. Databases such as Web of Science, PRIMO, ProQuest, Scopus, and Google Scholar were used, and some subject guides within geoscience under the Arctic and Antarctic regions were consulted. As mentioned, the main focus was on relatively recent research (post-2002), but to some extent earlier works were used to gain a broader understanding of the evolving research context. We focused on studies that were of potential interest from a Swedish/Nordic point of view, and so the chosen articles are mainly from European countries, the US, Canada, and Australia. However, some studies from South America, India, and East Asia were also included in the reading scope. Key words and acronyms used in the literature search were as follows: mining, mines (used throughout the search in combination with the following key words), work, organization, social, sustainability, sustainable, sustainable development, society, community, town, city, area, corporate social responsibility (CSR), diversity, cohesion, inclusion, demography, migration, lifestyle, livelihood, FIFO, built environment, housing, leisure, culture, gender, gender equality, women, men, masculinity.

In addition to the wide reading strategy outlined above, this paper is also based on results from a pre-study initiated by the Swedish state-owned iron ore mining company LKAB and Luleå University of Technology, Sweden. The aim of the pre-study was to form a base for focused multidisciplinary research on the relationships between mining and sustainable development. The pre-study was conducted from October 2013 to October 2014 and included researchers from the fields of Geosciences and Environmental Engineering, Ecology and Biodiversity, Economics, Political Science, History of Technology, Law, Human Work, Science and Gender, and Technology at Luleå University of Technology, and also researchers from the Swedish University of Agricultural Sciences in Umeå, and the University of Lapland in Rovaniemi, Finland. One activity in the pre-study was to review existing research on mining and sustainability in order to identify research gaps, and to put the Swedish case into a broader perspective by making international comparisons. The pre-study departed from the often-cited three pillars of sustainability: environmental sustainability, economic sustainability, and social sustainability. This paper condenses and presents its findings on social sustainability (Abrahamsson et al., 2014).

Even though the pre-study described above provided the theoretical and methodological base for this study, we would like to describe in brief the empirical context of the article. An interdisciplinary project was conducted by researchers at Luleå University of Technology

together with two municipalities with established mining communities in northern Sweden (Kiruna and Gällivare), as well as a mining company, an architecture and planning company, and several construction companies involved in city transformations in these two areas. An analysis of the social sustainability of these urban transformations from the point of view of inclusive planning has been done (Jakobsson and Segerstedt, 2014) through a series of surveys, interviews, and interactive workshops. The empirical base of the project is not directly used or referred to in this article, but theoretical thoughts related to it grew together with the results of the pre-study discussed above, as the research on those particular established mining communities was ongoing at the time.

3. Definitions and perspectives on social sustainability

It is a finely nuanced distinction, but sustainability, or the ‘ability to sustain’, usually refers to an (often ideal) end-state that can be sustained over time, whereas sustainable development refers to a process of change in the direction of achieving sustainability (Weingaertner and Moberg, 2014). This view of sustainable development as a movement forward and upward has been criticised (see Holden et al., 2014; Robinson, 2004; Zaccai, 2012). We acknowledge these criticisms but choose to use the idea since the mining companies we have been in contact with mainly discuss sustainable development rather than sustainability (probably because of the latter’s possible association with preservation and/or the restoration of older situations).

More particularly, social sustainability has moved in recent years from being a kind of add-on or facilitator to environmental or economic concerns to become a growing and independent field of study (McKenzie, 2004). The term certainly became more widely used in international research in the early 2000s, but a stable definition has never actually been agreed upon. Indeed, over the last decade, a number of quite different definitions have been proffered, discussed, and reviewed by researchers. In some cases social sustainability is simply seen as a positive result when a certain community or group meets sustainability criteria. More often, though, achieving social sustainability is seen as a rather distant goal that requires consideration of many factors. The process of reaching certain social changes is another way of understanding sustainability. These different definitions provide a means for measuring whether social sustainability is decreasing or increasing. At the community level, which this paper is particularly concerned with, one of the definitions that Dempsey et al. discuss is the following: “The sustainability of community is about the ability of society itself, or its manifestation as local community, to sustain and reproduce itself at an acceptable level of functioning” (Dempsey, 2009, p. 293). There are good reasons to argue that social sustainability in mining communities should be at least partly defined by considering the often unique circumstances that those communities have in common, as for instance the necessity of handling the dramatic changes associated with mining booms and recessions.

Dempsey et al. (2011, p. 291) in their literature review identify several aspects of social sustainability in urban environments studied by different scholars. Some are directly associated with the built environment and infrastructure, such as sustainable urban design, mixed tenure, an attractive public realm and quality housing, accessibility of services and facilities, as well as the “walkability” of neighborhoods. Other aspects focus on local social activities and structures such as active community organizations, social networks, social interaction, and thriving cultural traditions. Well-being and perceptions of the local social climate taking in quality of life, safety, social order, social inclusion, community cohesion (between and among different groups), and a sense of community belonging are also considered. The fair distribution of resources is a part of these discussions because of its close connection to social equity and justice, civic participation, and local democracy. Dempsey underlines that social sustainability is a dynamic concept that changes over time and in different social contexts. Even

though several scholars have sought to identify a universal set of sustainability criteria and measurements (see [Omam and Spangenberg, 2002](#); [Sahely et al., 2005](#); [Axelsson et al., 2013](#); [Missimer, 2015](#)), our point of departure is the constant variation in space and time that we view to be immanent to the concept of social sustainability. Even within a given spatial and chronological frame a variety of perspectives on what is (and is not) socially sustainable can co-exist and even contradict each other at the same time. Using diversity of livelihoods as our lens can enable situated interpretations of social sustainability, making it easier to see which social sustainability factors are of greater importance, and what specific forms suit certain local contexts.

[McKenzie \(2004\)](#) focuses on social sustainability as a life-enhancing condition within communities, and as a process within communities that can achieve that condition. Social sustainability occurs when formal and informal processes, systems, structures, and relationships coalesce and actively work to support the capacity of current and future generations to create healthy and viable communities. Socially sustainable communities are equitable, diverse, connected, and democratic, desirable qualities that clearly lead to a good quality of life. In addition, [McKenzie \(2004\)](#) also argues that the lack of a coherent definition of social sustainability is not something that should be derided or bemoaned, but rather accepted as a natural part of the sustainability agenda. He does, however, concede that although discussion over definitions is certainly fruitful, pragmatic concerns about the need for collective understanding and cohesive research results need to be considered in an extensive and multidisciplinary approach.

The public's expectations of ecological sustainability in mining (so-called "green mining") are often considerable in that invisible, zero-impact mining that leaves as few footprints as possible in nature is demanded. It is very much a question of protecting, preserving, and restoring the land as far as possible, and there are some emerging discussions in the literature on development, environmental changes, and how mines can actually have a positive impact on nature in the long-run. When it comes to the social dimension of sustainability, however, it is almost expected that a mine should leave a footprint (i.e. it should not be invisible and not have zero-impact either during operation or after closure). It is expected that mining companies should contribute to a strong technical and social infrastructure to ensure survival of the local culture and community after mining activities cease ([Ail and Baffi, 2007](#); [Wibowo and Rosyid, 2008](#)). It is unlikely that an individual mining company alone can do this, and it is especially difficult to achieve in small and remote communities. Many mining companies invest in the built environment and other infrastructural aspects of local communities, and in the context of this article we view such investments as possible contributions to social sustainability, especially if the investments correspond with citizens' needs. As [Suopajarvi et al \(2016\)](#) put it, "From the procedural perspective there were two general themes important for the local communities: knowledge and understanding of environmental changes caused by mining and second, the ability to be heard and have an impact on decisions about mining operation. From contextual dimension of social sustainability the main dilemma in Northern communities is between the fear and even anxiety of negative environmental impacts and viability of Northern localities generated by mining providing e.g. employment opportunities, prosperity and better service-structure" (s.61).

So, following up on the citation above, Infrastructure alone does not cover the broad spectrum of social sustainability factors – and even this part of the spectrum would (in our opinion) require collaboration and an ongoing dialogue between, among others, the local municipality, community organizations, and citizens of the areas affected by any planned infrastructural changes.

[Solomon et al. \(2008\)](#) note that there are numerous research gaps with respect to understanding the relationships between many of the social issues in mining communities throughout the world: "[There is a lack of] knowledge of specific regional development issues such as the impact of the resources boom on other activities in regions, on social

cohesion, on infrastructure and the long-term legacy of mining activities and closure" (2008, s. 146). Determining how social sustainability affects the mining industry as well as the social life of local communities requires developing a model that can assess any changes that occur. Comparison over time plays a special role in social sustainability because its temporalities may differ from those of ecological sustainability. Social sustainability is seldom about preserving or restoring the same cultural and social landscape for future generations, and nor is it about the necessity of perpetual economic growth of the specific local communities surrounding the mines. Social sustainability is rather about creating a dynamic and inclusive society in the "here and now", although at the same time it also includes a longer time frame and a wider geographical area. In other words, communities and mining companies need to be prepared for mine closures and other major changes in mining operations by, for example, positively responding to the challenge of dismantling communities that may require moving people, buildings, and businesses to other cities or areas in the region while still maintaining social sustainability in the larger region. Case studies on social dynamics associated with the mining industry recommend this type of long-term planning ([Lansbury and Breakspear, 1995](#)).

Another, often-cited definition of sustainability can be found in Our Common Future ([Brundtland et al., 1987](#)), also known as the Brundtland Report: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Some 15 years later, but in line with this, the final report *Breaking New Ground: MMSD Project (2002)* identified the main sustainability challenge for the mining industry as "to clearly demonstrate that it contributes to the welfare and well-being of the current generation, without compromising the potential of future generations for a better quality of life" ([Azapagic, 2004](#)).

Because of the complex multiple challenges which they face, it is not surprising that mining companies consistently express publicly a need to be innovative and efficient with respect to productivity, while at the same time being environmentally friendly, resource and energy efficient; providing a good, attractive, and safe work environment is also seen as important. Yet despite technological progress that has already provided better economical, ecological, and safer exploitation of raw materials, over the last few years deep skepticism towards mining – even in areas that have traditionally been supportive of the industry – has been gaining ground. In response, the various notions of corporate social responsibility (CSR), stakeholder management, social dialogues, partnerships with NGOs, "A social license to operate" or "A social license to mine" have emerged; these are all burning issues for the Swedish mining industry today, even if the ongoing recession, especially in iron ore mining, risks severely reducing sustainability activities. However, as [Ranängen et al. \(2014\)](#) show, sustainability reports are actually improving, and different kinds of guidelines, standards, and tools (such as the Global Reporting Initiative (GRI), the Social Impact Assessment (SIA), and the SR-standard ISO 26000) have been commonly adopted. Mining companies in Sweden seem to be routinely intensifying their work with stakeholder dialogue and stakeholder management systems, although the fact is that we still know little about the actual implementation of CSR. The most important areas of CSR for the global mining industry are its code of conduct, the publication of sustainability reports, and community involvement and development, especially when it comes to infrastructure, education, health care for both employees and local communities, and development of local SMEs, and agriculture ([Ranängen, 2015](#)).

Turning to the above-mentioned term "Social License to Operate", we may note that it was coined in the late 1990s by Canadian mining executive Jim Cooney ([Prno, 2013](#)), and academic discussions about the notion grew after the International Institute of Environment and Development published its MMSD report in 2002. As [Owen and Kemp \(2013\)](#) points out, the report suggests that local stakeholders do not trust the mining industry. Although the concept contributed to a

broader discussion of local social issues, these discussions were not seen as robust enough to provide a base for genuine collaboration between the industry and stakeholders (Owen and Kemp, 2013). Despite this setback, there are ongoing discussions about the criteria that are required to achieve socially sustainable optimizations. Bice (2014), for example, suggests that companies and societies need to define and articulate more clearly the criteria that underpin the “social license to mine” in order to facilitate more readily apparent and measurable indicators against which stakeholders can reach their own conclusions.

Several articles which were identified during our searches discuss how to attain social sustainability outside the mine (albeit without having made, it would seem, any real connections to the mining companies). The main strategies recommended are communicating with local citizens, involving them and the staff in decision-making, and providing equal opportunities to all regardless of gender, ethnicity, or disabilities (Hilson and Murck, 2000). Meeting social sustainability concerns, however, requires a focus on internal company matters to a greater extent than mining companies are encouraged (or perhaps willing) to report and make public. Other practical recommendations for mining companies include contributing to education of the local citizens and investing in various community projects such as schools, hospitals, and local sports activities (Azapagic, 2004; Lapalme, 2003).

However pragmatic and laudable CSR in general and the stakeholder and social license initiatives are, achieving their various goals is easier said than done. And of course, these approaches have also been severely criticized: they have been portrayed as lacking a perspective on power relations, for being vague and rhetorical instruments that can be lost in the general noise of political discourse, and as a smokescreen designed and used to try and address the needs of all stakeholders with the inevitable result that trying to satisfy everyone leaves almost everyone dissatisfied to some degree (McKenzie, 2004). Indeed, the very concept of CSR and the implications of its use have been criticized by many. The sharpest critique is based on empirical cases outside the scope of this article but nevertheless relevant for understanding the complexity of the issue. Some (e.g. Pegg, 2012) have suggested that the scope of the effects of CSR, and what have been claimed as CSR measures, tend to be overrated and misunderstood. Harvey (2014) argues that social development is not the way for extractive industries to get a social license to operate because of the “outreach” focus. Instead, he suggests shifting to “inreach”: in other words, focus on companies’ inherent attitudes and behavior towards local communities. According to Frynas (2005) CSR as practice is not integrated in community needs, and it has the potential to shift focus away from the macro effects of extractive industries. Very much in tune with this view, Hilson and Maconachie’s later study (2008) shows the limitations of the Extractive Industries Transparency Initiative in reducing corruption and increasing accountabilities in resource-rich developing countries.

The license to mine as a form of social trust in developed countries has mostly been considered from the stakeholders’ perspective. This approach, as opposed to a broader view of the community, might not give a social picture of the community as a whole, especially in the case of larger communities, or where a whole region might be seen as an area socially influenced by the mining industry. Some trends can be contradictory: what is positive for one stakeholder may be bad for another. Even for the individual stakeholder there might be contradictions – sometimes unconscious – or hidden agendas. Some “stakes” do not have a stakeholder that formulates relevant ideas and concerns and pushes them. And by doing what is possible, or only focusing on the one thing that gets the most attention in the media and public debate, there is a risk that other aspects of CSR are hidden. CSR is based on the idea that it should be integrated into companies’ core business processes (see for example Ranängen, 2015), but this inevitably entails a process of depoliticization: when socially sustainable development moves into a win-win area for business, it risks moving away from the inevitably contentious political arena where decisions will always favor certain vested interests over others and produce inevitable divisions.

In sum then, this paper views social sustainability as a set of processes that ensure a good balance between stability and change in both mining companies and the communities that surround mines. This means processes that can meet basic human and environmental needs, all groups are offered good opportunities, and social, cultural, and economic growth is made possible for a broad variety of people, for different types of businesses, trades, and sectors of the labor market. From the individual’s perspective, this can be described as the possibility to live a fruitful, meaningful, and happy life. To achieve this goal, both women and men should have the opportunity to fully participate in and influence their work, social lives, and private lives. One way of ensuring that these complex needs are met is to develop technologies, organizations, and systems where humans are at the center of development and innovation. Here we include operations and management practices in the mining companies that are compatible with positive social factors such as good employment opportunities, good working conditions, learning opportunities, gender equality, and diversity of cultural expressions.

4. Diversity of livelihoods and social sustainability

In the discussions on different views of social sustainability and the meaning of this term, diversity emerges as a key word. Several researchers have highlighted that distribution of resources within and between groups (as well as access to services for individual people with different incomes, gender, ethnicity, and abilities) is of importance when analyzing social sustainability (Griessler and Littig, 2005; Grosser, 2009; Vallance et al., 2011). When the question of distribution is considered, one of the analytical risks is to view the interests of a certain group as essential for its members. Diversity of livelihoods as a term and an analytical lens allows us to approach the perspectives of different groups while avoiding such essentialism, because the possibility of meeting the needs of a certain social group in different temporalities (as the classic definition of sustainability cited earlier suggests) would still bear the necessity of meeting different needs and preferences that members of this group have. In this paper, diversity is interpreted as a variety of livelihoods that a person can lead in a community largely shaped by the mining industry. The ethnic and social diversity of a community are two of the many positive signs of diversity of livelihoods and social inclusion, but they are not necessarily a goal in themselves. It can be argued that all of the factors mentioned in the definitions above could help one obtain a meaningful life, a life where one is free to choose among many livelihoods. Aspects of urban life in established mining communities such as social cohesion and inclusion, migration and demographics, good housing infrastructure, and gender equality can enable (or disable, in a figurative sense) diversity of livelihoods in those communities. These factors are further reviewed here.

A strong community identity can be seen as good grounds for social cohesion, but at the same time this can be associated with a certain lifestyle that is not inclusive – for example if this lifestyle has a connection with traditional (specifically rural and mining worker) masculinity (Abrahamsson, 2008; Petrova and Marinova, 2013; Bryant and Jaworski, 2011; Sanders and Easteal, 2013). When it comes to social cohesion and inclusion, some studies focus on the local community with respect to decision-making processes (e.g. issuing a “social license to mine”) (Owen and Kemp, 2013; Michell et al., 2013). Swedish studies of mining communities discuss strong community identity (Nilsson, 2009, 2010; Hägg, 1993), which can be seen as promoting cohesion, but as alluded to above this identity is often associated with a certain lifestyle that is not inclusive and is characterized by “traditional masculinities”. Some international studies have also found mining communities to be notably cohesive internally (Robinson and Wilkinson, 1995; Petrova and Marinova, 2013), but local networks were not considered strong and inclusive. Scott et al. (2012) argue that strong community cohesion might lead to the perception of indigenous people

and FIFO workers as ‘The Other’. They use terms such as diversity of social life (p. 155) in a similar way as diversity of livelihoods is used here, and the conclusions are thus formulated in a way that makes the company-community level research gap potentially easier to bridge.

Research in the area that connects community cohesion and the mining industry can be seen as generally underdeveloped, although some interesting observations can be made on the current literature. One of the scales broadly used to measure cohesion (Buckner’s Neighborhood Cohesion Index, NCI) was developed based on material from a small mining community (Elliot Lake in Canada (see [Robinson and Wilkinson, 1995](#))), but no connection was made between the mining industry and the extent to which it can influence community cohesion.

In the discussion about what can be expected of mining companies striving for a social license to operate [Harvey \(2014\)](#), as mentioned earlier, makes a point that mining companies should focus on the company itself and its interaction with communities rather than having an outreach perspective. In a quantitative study, [Iverson and Maguire \(2000\)](#) found a relationship between job satisfaction and life satisfaction for a large group of male mine workers in Queensland, Australia. The study showed that after the variables of kinship support and family isolation, job satisfaction is the next most significant variable that affects overall life satisfaction. Further analysis showed that job satisfaction influenced life satisfaction more than life satisfaction influenced job satisfaction. Based on this finding, it seems important to look at diversity of livelihoods at the community level as well as the company level.

One of the perspectives that could be used to bridge company level and community level analysis is diversity. Studies of diversity and mining companies often focus on ethnic and gender diversity (subjects reviewed elsewhere in this paper). Other studies have focused on ethnic diversity with a particular interest in the history of exclusion of indigenous people from the recruitment base of Swedish mining companies, for instance [Persson \(2015\)](#), and, in an international context [Tiplady and Barclay \(2007\)](#). [Crawley and Sinclair](#) have examined how to broaden a mining company’s recruitment base by including indigenous people, a strategy based on power sharing (2003). The conclusions in the study placed high hopes on the then upcoming UN declaration on the Rights of Indigenous People that was adopted in 2007. One might argue though that the UN declaration lacked the ability to alter the normative environment for mining companies. Indeed, the aftermath of the declaration proved to be something of a disappointment in that it became clear that it did not – perhaps could not – change things anywhere near enough for indigenous people; rather, positive advances would, as so often in the past, come from local pressures exerted and directed from below. Or, as [Lawrence and Moritz \(2019\)](#) put it, “If we were to take all of these policies, guidelines and developments in international law and norms at face value, there would be no further story to tell, but the emerging global recognition of indigenous peoples’ rights continues to stand in stark contrast to the reality on the ground” (p. 42). There is though an undeniable ambition to preserve indigenous peoples’ cultural expressions. Australian and North American studies have examined how the mining industry has negatively affected indigenous people by severely limiting their ability to practice their traditional lifestyle. To this end, some studies have focused on negotiating land use and inclusive job recruitment ([O’Faircheallaigh, 2013](#); [Crawley and Sinclair, 2003](#)). The concern is often with indigenous peoples’ rights and access to prior, free, and informed consent to mine, for example, as these issues relate to international law ([Ward, 2011](#)). Studies on social inclusion concerning indigenous people in Swedish mining districts should help to fill the existing knowledge gap. In fact, the specific circumstances in northern Sweden require an even broader view of ethnic and cultural inclusion. In this region, different languages and various cultural identities have co-existed for a long time, so successful mining requires a more inclusive social climate.

Smaller and isolated mining communities go through demographic changes both during a mining boom and during a mining recession. Two demographic scenarios in northern Sweden, baseline and mining, were compared and studied in the economic context of the changing job market by [Ejdemo and Söderholm \(2011\)](#). Their study showed that a mining boom period is accompanied by higher income levels in the community. Another result is that both the public and the private non-industrial sectors grew in association with the boom period compared to the baseline, although proportionally they became a smaller part of local employment.

[Petrova and Marinova \(2013\)](#) distinguish between mobile and transient populations. Mobility can be measured by calculating the percentage of people who changed their address during a certain number of years, whereas the transient population is a cultural phenomenon. In the case study that they described, FIFO workers lived in the mining camp outside the city, some distance away from where most of the services are provided. These workers did not participate in the life of the local community. [Petrova and Marinova](#) found that the transience of mining communities in Australia is associated with lower community cohesion, making it difficult to include new residents in community networks. [Vodden and Hall \(2016\)](#) took a broader overview of long-distance commuting (LDC) in extractive industries, and the implications that using this type of workforce has for rural regions. Their conclusions are in line with what [Petrova and Marinova](#) presented: using LDC has a negative impact on community engagement, on the capacity to maintain a certain level of services, and on community planning. Even though the connection between company and community is shown in [Vodden and Hall’s](#) study, the connection could be analyzed in a more sophisticated way by making more explicit connections between the meso- and macro-levels.

Attractive housing opportunities and the quality of the built environment are important infrastructural factors for social sustainability ([Dempsey et al., 2011](#)). During an active period, the mining industry will need additional workers, resulting in new permanent or temporary housing. Although it is unclear what responsibilities in community planning mining companies might share with the community and government, few studies have addressed this issue; indeed, at least one study ([Morrison et al., 2012](#)) has explicitly noted the lack of studies in regional and rural planning with respect to local and state governance collaborating with the mining sector. Some mining communities, however, have addressed these challenges: “active and well-resourced mining companies are increasingly recognized as filling the gaps in regional planning and service delivery where government activity is weak and community capacity is low” ([Morrison et al., 2012](#), s. 479). If diversity of livelihoods was used as an analytical lens here there would be more potential to see how the consequences of mining companies’ participation in planning enable or disable possibilities to live meaningful lives in diverse ways. The active participation of mining companies in urban planning could also be a problem, however. According to [Rudder \(2008\)](#), such cases would mean citizens having very limited control and influence over the decision-making process. Against that, however, it can be argued that because this form of CSR aims to positively influence the image of a mining company, it would be in its best interest to involve local actors in infrastructure planning in a meaningful way, a strategy that may result in local support for a mining company’s actions. Regardless of the rhetoric of CSR and urban planning the main challenge would be achieving an improvement for mining communities from the citizens’ perspective rather than the company’s.

[Petrova and Marinova \(2013\)](#) also consider the role of housing in their discussion of the social impact of mining. For example, the lack of housing in a mining community in their study results in high prices during the active mining period. As a result, good housing will be out of the financial reach of some people who will have to move to find affordable housing, resulting in longer commutes to work.

With respect to social inclusion and the mining industry, gender is a

broad theme that is extensively discussed. Gender issues in both demographic changes in mining communities and in mining companies and workplaces may be of great importance for the local social climate. Such changes are discussed in the Swedish and international studies (Abrahamsson and Johansson, 2006; Lozeva and Marinova, 2010) which examine how challenging conservative gender constructs on an organizational level as well as on the community level can improve people's lives (although less attention is paid to the community level).

Elaborating further on the demographic issues discussed earlier, it is often noted how young people, especially young women, move out of rural communities in the north of Sweden (Abrahamsson, 2008; Rauhut and Littke, 2016). Kocziszky et al. (2012) describe similar gender-related out-migration tendencies in northern Hungary and in Västerbotten, Sweden. Similar results are presented by Saunders (2013) and Lockie et al. (2009); they found that more men than women lived in Australian mining communities, although the specifics of these demographic patterns varied depending on community history, the size of the mining communities, and other factors. Moreover, they too found that it is common for younger women to leave mining communities. It might though, be hard to tell how much this demographic phenomenon is specifically connected to the mining industry, or rather is the result of other rural social patterns that can be found in geographically remote communities with no mining activity.

Part of the problem in the Swedish context almost certainly lies in the culture and working life of the mining communities of Norrbotten and Västerbotten. The picture is ambiguous and complicated, as Abrahamsson (2008) argues, but the culture of these places can still legitimately be described as a traditional, patriarchal, and male-centered culture with a more gender-segregated division of labor between women and men compared with other regions in Sweden, in working life as well in domestic life; it is, in short, a culture where women are often clearly subordinated or “invisibilized” (cf. Nilsson and Nilsson, 2010; Hägg, 1993; Jakobsson, 2008; Waara and Jacobsson, 2008; Rauhut and Littke, 2016). Similar patterns can be found in Australia (Bryant and Jaworski, 2012; Saunders, 2013) and the USA (Mercier, 2012). The end logic of this is that an increased exodus of young women from rural communities could further intensify the “masculine” culture that saturates rural areas, where myths about place and work have intertwined to reinforce gender inequalities in logging, mining, and long shoring (Mercier, 2012). Sanders and Easteal (2013) show that rural and male-dominated workplace environments are more likely to be permeated with sexual harassment. Abrahamsson (2008), meanwhile, argues that mining companies in Norrbotten and Västerbotten need to develop a strategy to deal with and manage these issues.

Reeson et al. (2012) show that the high incomes associated with the Australian mining sector may also lead to greater inequality. That is to say that the income gap between women and men increases when mining employment increases in a region. In another Australian study, Lozeva and Marinova (2010) found that fundamental problems associated with gender discrepancy and power negotiation marginalized women and traditional owners of the land where the mine operated. Somewhat paradoxically, these problems resulted in a decline of the population during a mining boom (when one might reasonably assume that the population would increase). Where FIFO operations flourished, the local society became “a men's town”; it is true that a small service sector developed, but it was dominated by low-paid women and high-paid FIFO men, and provided little in the way of decent opportunities to women and the younger generation of the local community (Abrahamsson et al., 2015). In support of this assertion, Raju and Lahiri-Dutt (2011) convincingly argues that FIFO systems reduce diversity and heterogeneity.

Eveline and Booth (2002) found that when Emsite introduced a fortnightly FIFO system, which allowed employees to leave their families in the nearest city and fly the 2000 km to work and back, it was portrayed as a high-standard modern mining company with ambitions for its socio-technical systems management and gender equality. The

fact that all workers had to leave family responsibilities behind them for two weeks every month was not viewed as a gender issue. However, Eveline and Booth conclude that the FIFO system in this case had different effects on women and men since none of the women employed at Emsite had children under 18, whereas more than half of the male interviewees did.

Many of the problems associated with FIFO have not been seen in Swedish mining regions. This is because contrary to mining operations in Australia or Canada, a large number of mining workers in Sweden are locals who live nearby (Knoblock, 2013); in fact, drive-in/drive-out (rather than FIFO) might be a bigger issue for the mining sectors located in the northernmost parts of the country. This supports the conclusion that the specifics of the local culture are particularly relevant when it comes to understanding prevailing conditions (Bryant and Jaworski, 2012; Abrahamsson, 2008), as well as being an important factor that might affect future development.

Kiruna is an established mining community in the northern Arctic part of Sweden undergoing major transformation: parts of the town are being rebuilt and other parts are being moved while a part of the town is undergoing demolition because of mining activities taking place close to the old center. The transformation is being financed by the mining company while decisions about the new urban structures are made by the municipality using dialogue and research to find out citizens' preferences. Abrahamsson and Johansson (2006) and Andersson (2012) show that even if changes occur in Kiruna thanks to the city transformation project that is underway, both the local culture and the miners' culture are still likely to remain very much based on a type of miner masculinity that has its roots in old ideas of what it means to be a “a real miner”. Similar patterns can be found in the construction sector and in the surrounding small businesses that rely on the mine. Nilsson and Nilsson (2010) actually sees the city transformation project in Kiruna as an instrument of power that favors men and reproduces the dominant pattern of masculinity; it basically confirms traditional masculine interests. The professional cultures that are imbued with status are those usually occupied by men. Similarly, Bell and York (2010); (2012) show that strategies of “the Friends of Coal” included the appropriation of cultural icons that exploited the hegemonic masculinity of the region. Bell and Braun (2010) show that the hegemonic masculinity of the region, which is closely tied to the coal industry, functioned as a deterrence to men's involvement in the environmental movement. King et al. (2008) conclude that even if gender equality is seen as important to the citizens of Kiruna, conflicting ideas, ranging from neo-liberal strategies to more traditional notions of gender relations, may result in the culture failing to change. Stenbacka (2011) highlights national mass media, movies, and television as contributing to the construction of rural masculinities that compare unfavorably to urban masculinity: rural men are seen as “backward” and out of place in the modern world. This marginalization – which verges on outright denigration – of rural men may perpetuate gender inequality.

The literature that discusses social sustainability in the mining industry from a gender perspective is not particularly extensive, although it is growing. It mainly considers mining in developing countries and focuses on social problems for women. Women and men usually have well-demarcated gender roles in indigenous communities so the impacts of mining are not the same across the sexes (Ahmad and Lahiri-Dutt, 2006; Lahiri-Dutt, 2012a, 2012b; Nayak and Mishra, 2005; Lozeva and Marinova, 2010). The new jobs, if any, usually go to men, and women risk unemployment if they lose the possibility of earning from farming; it is worth mentioning Lahiri-Dutt's (2012b) point that some of this literature has helped give rise to the stereotype of women as victims. There are some exceptions presenting more positive examples describing how large mining companies work to counteract the male-centric mining industry by integrating gender considerations into community relations. The success of these efforts is, though, debatable: Eveline and Booth (2002) describe how a new diamond mine in Australia had strategic plans to use gender equality as a tool to develop a

stable industrial and economic environment, but the article concluded that this attempt failed and resulted in almost the opposite effect than that which was intended. Gender issues were also included in a baseline study (2007–2008) of the socio-economic effects of Northland Resources' planned mining activities in Pajala, Sweden, and Kolari, Finland (Abrahamsson, 2008). The Swedish strategic research and innovation agenda for the mining industry *Breaking Ore and Gender Patterns* (Andersson et al., 2013) identifies important links between gender equality, efficient use of resources, innovation, and sustainable growth. The conclusion was that gender equality is seen as a strategic profile issue in the Swedish mining industry, but it is complex and an important area for ongoing research and joint activities for the mining sector, mining companies, and local communities. It should be said that there are some exceptions to the generally negative assessment set forth in the literature; more positive examples (see Kemp, 2010) describe how large mining companies work to counteract the male dominance of the industry by integrating gender considerations into community relations.

For several years, the most obvious gender issue of the Swedish mining industry has simply been attracting and retaining women in its “classic” male-dominated workplaces (Andersson et al., 2013). Historically, male ideals, men, and blue-collar masculinity have dominated the structures, practices, and procedures of mining (Andersson, 2012; Lahiri-Dutt, 2007, 2012a). Today we can see a growing number of women in the major mining companies, but still some 85–95 per cent of mining workers are men. Similar figures (and even fewer women) can be found in many other countries, such as India (Nayak and Mishra, 2005; Lahiri-Dutt, 2012a) and Australia (Eveline and Booth, 2002; Bryant and Jaworski, 2011). However, the number of women has always risen during good times and fallen during recessions. It has yet to be seen what will happen with the number of women in the companies due to the ongoing recession.

“Women in mining” is a large research theme that focuses on why and how women are excluded from the mining industry (see for example Abrahamsson and Johansson, 2006; Abrahamsson and Somerville, 2007; Andersson, 2012; Blomberg, 1995; Eveline, 1989, 2001; Eveline and Booth, 2002; Lahiri-Dutt, 2007, 2011, 2012a, 2012b, 2013; Sanders and Eastal, 2013; and Tallichet, 2006). A different but closely related theme is “men and masculinity in mining”; this research focuses on the problematic aspects of the common type of mining masculinity. There is still not only an overt visibility of men in the mining sector, but also a taken-for-granted conflation of men with competence and expertise. Structures and technologies are portrayed as gender-neutral but many of them actually favor men (Lahiri-Dutt, 2011; Knoblock, 2013). Moreover, in mining, as in other male-dominated industrial organizations, the workplace cultures are often based on male bonding, homosocialization, imitation/alikeness, and the exclusion of others (e.g. women, office staff, and management) (Fältholm and Abrahamsson, 2015; Tallichet, 2000). Within this prevailing notion of masculinity it is difficult for a man to be associated with competencies, attitudes, or behaviors that have a female gender-code (Eveline, 2001, 1989; Somerville and Abrahamsson, 2003; Abrahamsson and Somerville, 2007; Eveline and Booth, 2002; Lahiri-Dutt, 2007, 2012a, 2012b).

Concerning diversity of livelihoods in gender-based studies of established mining communities, we would like to argue that studies implicitly using this perspective do come closer than most to bridging the gap between studies on mining companies and mining communities. Lahiri-Dutt in her article on digging women (2012) stresses stereotyping women (and men) in mining and how it affects their life choices. The conclusions of the article are relevant both at the company and community level, and examples in the article cross the company-community boundary. Explicitly focusing on enabling diversity of livelihoods could ensure such effects by forcing researchers to analyze what it is in community development and company actions that may structurally hinder people from being able to live their lives by making

diverse choices.

Mining masculinity is often constructed around mystery, history, physical bravery, traditional manual hard work close to the ore face, macho attitudes, and old practice-based knowledge of the rock and its extraction (Abrahamsson and Johansson, 2006; Lahiri-Dutt, 2012a, 2012b, 2007; Eveline and Booth, 2002; Andersson, 2012). The majority of male mining workers do not live or act fully according to the ideals and norms of this “macho-masculinity” (Fältholm and Abrahamsson, 2015), but many of them still often glorify, protect, and promote it. They all share the same picture of what a “real” mining worker is, and they seek to conserve – and if necessary restore – the old stories and glories of mining work (Abrahamsson and Somerville, 2007; Somerville and Abrahamsson, 2003). This miner masculinity functions not only as a gatekeeper towards women and hinders gender equality interventions (Eveline and Booth, 2002), but can also create problems for the implementation of safety measures, new technologies, new organizational forms, and environmental awareness; it also creates barriers preventing a diversity of livelihood options for men themselves (see, e.g., Eveline and Booth, 2002; Somerville and Abrahamsson, 2003; Abrahamsson and Johansson, 2006; Abrahamsson and Somerville, 2007; Andersson, 2012).

Although this type of masculinity can be seen as obstructively conservative in many ways, it cannot be denied that it enjoys significant support in local mining communities, and the men seem to experience it as an enjoyable and undemanding form of social interaction. It can be seen as a way for men to deal with feelings of subordination, and it has also important connections to pride in mining work, union solidarity, and working-class ideals and traditions (Lucas and Buzzanell, 2004; Lahiri-Dutt, 2007). Here we find some explanations as to why gender segregation and gender stereotypes are difficult to change in both mining companies and communities – put simply, traditions run deep and are strongly supported by significant numbers of people.

Viewed through the theoretical optics of gender, the studies alluded to in this paper show that gender equality is an important part of social sustainability; however, most of this research does not include specific analyses of the links to other aspects of social sustainability, especially those which exist outside of the companies. There is clearly room for a great deal of further work exploring these connections.

5. Conclusion

The existing body of published knowledge rarely deals with social sustainability in the context of established mining communities, and when it does engage with the subject it does so with insufficient rigor and depth. Indeed, although the studies considered here all approach social sustainability issues, it is at best a tentative approach and in most cases a social sustainability framework and the accompanying terminology is not even used. The latest studies on mining and sustainability often list benefits for the community as “further challenges”. The lack of knowledge on this aspect of the impact that the mining industry has on the local community is especially underdeveloped if compared to its economical or ecological impact; this is, however, slowly changing, and we may hope for more useful studies in the near future.

Diversity of livelihoods was used in this article as an analytical lens to approach (some aspects of) social sustainability in established mining communities. Numerous studies on social cohesion and inclusion in the mining context were reviewed from the point of view of the co-existence of an operating mine and an established community; the authors reached the conclusion that social cohesion might be an ambiguous social value with which to measure social sustainability. In the context of diversity of livelihoods, social cohesion often combines with constructing and casting indigenous groups and FIFOs as the other, limiting social inclusion.

Numerous studies on gender patterns in mining companies and established mining communities were reviewed, showing the clear pattern of gender imbalance in the mining companies as well as many

years of systematic exclusion of women from the industry. The construction of a distinct mining masculinity shows that it contributes to an ambiguous pattern, similar in some ways to the patterns of social cohesion in mining communities. On one hand, it favors people showing a certain type of masculinity, reproducing patterns of behavior that make the social environment comfortable for those who practice it – on the other hand it limits diversity of livelihoods as it contributes to the pattern of systematic exclusion of those not practicing this and/or not having access to these types of practices.

In concluding this analytical review, it can be suggested with some confidence that diversity of livelihoods is useful for analyzing certain aspects of social sustainability that bridge the research gap between studies of mining companies and studies of mining communities. This analytical lens can be used to critically discuss such aspects of social sustainability as social cohesion and inclusion, migration and demographics, housing infrastructure, and gender patterns, from the very different perspectives of the mining operation and the local community. More practically, diversity of livelihoods can be used for research into and the practice of inclusive urban planning in sparsely populated urban environments in rural areas, especially established mining communities, addressing the challenge of incorporating social values in the planning process. Future research needs to continue to analyze the links and crossroads between the mining industry and surrounding communities, different social groups and interest groups, perspectives, scopes, and temporalities.

Acknowledgments

Special thanks to: Mats Jakobsson, Senior Lecturer at the Department of Business Administration, Technology and Social Sciences for supervision and proofreading, Anna Maria Johansson, PhD student at the Department of Business Administration, Technology and Social Sciences for her help with final decision on terminology – as well as all other academic partners involved at Luleå University of Technology.

We would also like to thank the agencies, organizations and projects funding this research: VINNOVA, Sweden's innovation agency. Project name ATTRACT Grant ID: SEK 19 965 793; FORTE, Swedish Research Council for Sustainable Development. Project name ALICE, Grant ID: 249-2011-1710; HLRC, Hjalmar Lundbom Research Centre. Project name Architecture for attractive urban environments, Grant ID: 12348.

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