



# Insights from case studies into sustainable design approaches in the minerals industry



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## ABSTRACT

The concept of sustainability, which is now well entrenched in the minerals industry, can be an effective driver for higher levels of innovation. With the minerals industry venturing into riskier locations, new mining projects need to deliver both strong sustainability benefits while meeting the necessary technical and financial requirements. Improved approaches to recycling, resources conservation, energy and water efficiency, greenhouse gas reduction, biodiversity, local enterprise development, and community development programs all meet the aims of good sustainability practice and require innovative techniques to move away from the 'business as usual' paradigm. This paper outlines the recent developments on the SUSOP sustainability opportunities and risks framework, which utilises the Five Capitals sustainability model, to provide a holistic approach for delivering enhanced environmental, social and community outcomes into mining and minerals projects. Case studies where this framework has been applied are discussed and the key emerging themes such as the benefits of better engagement with local stakeholders, the value from creation of local enterprises, and misperceptions of costs related to sustainability outcomes are highlighted.

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## 1. Introduction

There is a rising expectation across the broader society that the resources industry needs to develop their projects and run their operations in a socially and environmentally responsible manner. Environmental, community and social factors are playing an important part in the decision making process in developing new resources projects and this is supported by recent analysis related to project delays (Fraser Institute, 2013; Franks et al., 2014). Understanding these factors at the early development phases of new projects is critical to producing a project that both meets societal expectations and have the best possible chance to be delivered on budget and to schedule.

Added to this, research workers have documented the growing importance of 'social licence to operate' over recent years (Solomon et al., 2008; Prno and Scott Slocombe, 2012; Owen and Kemp, 2013; Prno, 2013) and have highlighted the complexities that are facing the industry as it ventures into more remote and riskier locations where project proponents have to engage with stakeholder groups who will have a wide and sometimes conflicting range of interests and expectations. These research findings are

supported by reported trends across the mining and metals industry that indicate 'social licence to operate' is considered to be a key business risk given the increased levels of "activism, digitally connected stakeholders and politicians who need to respond to general consensus" (Ernst and Young, 2013). As a result, better appreciation of crucial sustainability risks (i.e. environmental, social and community risks) early in project development can then promote the need to identify innovative solutions that can potentially mitigate these risks.

This paper examines the need for a more holistic approach to the development and operation of mining projects, in line with the changing nature of the industry and the concepts of achieving and maintaining a 'social licence to operate'. It highlights the benefits of utilising a capitals based sustainability model in conjunction with a project risks and opportunities framework SUSOP (SUStainable OPERations), which is applied in the early phases (concept, pre-feasibility and feasibility) of industrial projects (mining, chemical, energy, oil and gas). In this framework, sustainability principles are utilised as the basis for identifying innovative opportunities that deliver beneficial environmental, community and social outcomes as well as identifying risks that have the potential to affect the environment, local communities and broader society. Finally it presents case studies where this framework has been

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applied and discusses the themes that have emerged from these case studies.

## 2. The drivers for mining in the 21st century

### 2.1. The changing face of mining development

Mining development activity has over the last 50 years moved from, in broad terms, countries that both produce and consume metals to countries that produce metals that are then exported to metal consuming countries. [Humphreys \(2013\)](#) demonstrated this trend by examining the world in two groups – metal consuming regions (North America, Western Europe, Japan, China and the Former Soviet Union) and metal producing regions (Asia less China and Japan, Africa, Latin America and Oceania). This analysis showed that in 1960 about 55% of copper supply was mined in the country in which it was ultimately consumed; by 2010, 50 years later, this percentage had dropped to 25%. Similar changes have also occurred for bauxite, iron ore and nickel ([Humphreys, 2013](#)). A key consequence of this shift is that governments of producing countries have become more focused on how to maximise the benefit of metal extraction to their economies rather than on how to supply cheap raw materials, the main aim of countries that are both metal producers and consumers. While mining projects still need to be financially and technically viable, there is now greater attention on how projects in the metal producing regions can be made to serve the broader interests of national and regional economic development ([Humphreys, 2013](#)).

### 2.2. The growing importance of social licence to operate

Coupled with these national interests mentioned above, the interests of affected stakeholders at a project or operational level have heightened over the last generation. The term ‘social licence to operate’ has become part of the mining industry language, especially in regard to sustainability and social aspects, and arguably best reflects concisely the influence that key stakeholders can have over a new or existing mining project. While the term ‘licence to operate’ means in general acquiring the necessary approvals for the relevant regulatory and statutory authorities and is clearly defined in one or more formal outputs i.e. a documents, ‘social licence to operate’ is far less tangible. The terms does, however, encompass the local, regional and national interests from mining developments and if stakeholders believe that these interests are severely compromised, mining projects or operations can lose their ‘social licence to operate’ which manifests itself in project delays or sometimes cessation or stoppages in production or possible closure of existing operations. In succinct terms, an operation is said to have a social licence when it achieves on-going acceptance or approval from the local community and other stakeholders who can affect its profitability, and without a social licence it is very difficult for a mine to operate effectively or profitably ([Lacey et al., 2012](#)).

Workers in the field related to the social aspects of the industry have documented the growing importance of ‘social licence to operate’ over recent years. [Solomon et al. \(2008\)](#) stated that the social dimensions of the mining industry are critical to business success, but remain the least understood aspect of the business concept of sustainable development. Conventional approaches to mineral development no longer suffice for local communities, who have demanded a greater share of benefits and increased involvement in decision-making, which has manifested into the need for mineral developers to obtain a ‘social license to operate’.

[Prno and Scott Slocombe \(2012\)](#) concluded that there is now a widespread recognition that mineral developers need to gain a

‘social license to operate’ from local communities in order to avoid potentially costly conflict and exposure to social risks. Subsequently [Prno \(2013\)](#) proclaimed that mining communities are demanding a stronger involvement in decision making for local mining projects, a greater share of benefits, and assurances mineral development will be conducted safely and responsibly, and recognised that full regulatory compliance has been insufficient means to meet these needs.

[Owen and Kemp \(2013\)](#) assert that while “social licence has contributed to raising the profile of social issues within a predominantly industrial discourse, a primary failure is its inability to articulate a collaborative developmental agenda for the sector or a pathway forward in restoring the lost confidence of impacted communities, stakeholders, and pressure groups”. They argue that industry needs, at least initially, to reconcile its internal risk-orientation with external expectations and this requires a less defensive and more constructive approach to stakeholder engagement and collaboration.

### 2.3. Impacts on project development

A recent study on the costs of conflicts between communities and companies in the extractive sector ([Davis and Franks, 2014; Franks et al., 2014](#)) surmised that most extractive companies do not currently identify, understand and aggregate the full range of costs of conflict with local communities. As part of this study, the authors stated that the most frequent costs were those arising from lost productivity due to temporary shutdowns or delays and that, as an indication, a mining project with capital expenditure of between US\$3–5 billion will incur costs of roughly US\$20 million per week of delayed production in Net Present Value (NPV) terms, largely due to lost sales. Actual examples included a nine-month delay during construction of a Latin American mine in 2010 resulting in US\$750 million in additional project costs; community conflict leading to stoppages and down days that cost a project US\$100 million per year and community conflict, which shut down a few key power lines, caused an entire operation to halt at a cost of US\$750,000 per day ([Davis and Franks, 2014; Franks et al., 2014](#)).

In addition to the above findings, a recent annual mining review ([Fraser Institute, 2013](#)) found that 36% of the respondents indicated that public opposition to mining affected the permitting and/or approval process for any projects with which their company was directly involved. Of those 36%, 24% indicated that the delay was 2–4 years, 18% indicated that the delay was more than 4 years and 21% that their permitting and/or approval process was rejected ([Fraser Institute, 2013](#)).

These figures show that significant delays or even rejection of mining projects due to public opposition are not isolated incidences and combined with the conflict costs presented above ([Davis and Franks, 2014; Franks et al., 2014](#)) illustrate the strong need for enhancing the understanding of these issues as early as possible in the project development process.

### 2.4. The role of better design processes

The literature, analysis and data presented in this section highlight the complexities that are facing the industry as it ventures into more remote and riskier locations where project proponents have to navigate, engage and negotiate with stakeholder groups who will have a wide and sometimes conflicting range of interests and expectations. This becomes heightened for countries that are deemed ‘metal producers’ and not ‘metal consumers’ as they want, need or desire tangible benefits that come from mineral development but without long-term environmental, community and or social impacts.

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