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Viewpoint

Socio-economic assessment in the extractive industries—Avoiding the pitfalls

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ABSTRACT

There is increasing interest in the use of socio-economic assessment (SEA) as a tool to support regulatory decision-making and to help businesses maintain their social licence to operate. However, its application in the extractive industries remains unclear. Minerals and metals move through a complex and dynamic global supply chain, which makes it difficult to 'assign' socio-economic impacts to any one location. Intermediate products (e.g. metals) generally comprise many different inputs – some of which may be used in very small quantities but, nevertheless, impart essential and/or valuable properties to the final product – making it challenging to assign values. The SEA process is made even more complex by the diverse range of downstream applications which these products have, the potential for future innovation and a lack of reliable socio-economic statistics for the sector. In 2013/14, Risk & Policy Analysts Ltd undertook the first global study on the socio-economic value for manganese (Mn). This paper describes the key obstacles identified while undertaking this research and outlines some of the steps that were taken to ensure a robust SEA. It highlights important lessons that should be taken forward when undertaking future SEAs in the extractive industries.

1. Introduction

Manganese (chemical symbol: Mn) is one of the most widely used and versatile naturally-occurring elements in the world.[1] But despite its prevalence in (and obvious benefits to) our daily lives, the strategic importance and socio-economic value of Mn has largely gone unnoticed by decision-makers and the general public. To address this, the International Manganese Institute (IMnI) commissioned Risk & Policy Analysts Ltd (RPA) to undertake the first global study on the socio-economic value of Mn (Table 1). The study, undertaken in 2013/14, sought to analyse the socio-economic importance of Mn ore and Mn alloys globally, at a regional level and in key producing countries. Basic production and economic data were employed, together with modelling tools, to estimate the direct and indirect economic value of Mn ore and alloy production, as well as their effects on employment (jobs and wages). Based on a top-down analysis of the key supply chains for Mn, the study also set out, in economic terms, the criticality of Mn in some of its key applications (e.g. steel), taking into account the unique and specific physical and chemical properties of Mn and the qualities that it imparts to particular products. Case studies were used to contextualise the results of the statistical modelling and to illustrate, qualitatively, some of the benefits of Mn that were more difficult to quantify.

This paper describes the main hurdles identified while undertaking the first socio-economic assessment (SEA) of Mn. It outlines some of the steps that were taken to overcome these challenges to ensure a robust SEA for Mn, and highlights key lessons that should be taken forward in undertaking future SEAs in the extractive industries.

2. Socio-economic assessment (SEA) and the extractive industries

As a term, SEA encompasses a set of analytical tools and approaches for analysing the net social and economic impacts

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[1] Mn, in the form of Mn alloys, is an essential input and process additive for the steel industry (in fact, you cannot make steel without Mn); a vital element in the manufacture of some dry cell and other batteries (notably, those used in electric vehicles); and is necessary for the production of some aluminium alloys (e.g. those used for beverage cans) and consumer electronics (e.g. television circuit boards). It is crucial for maintaining the health and well-being of the human body and is thus used in food supplements and medicines. It is also a crucial micronutrient needed for plant growth and hence plays a vital role in agricultural production (fertilizers, fungicides). In addition, it is used in animal feed and water purification products.

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Table 1
Key findings from the Mn SEA.

Product	Indicator		Low estimate	High estimate
Mn ore	Economic contribution to the global economy (US$ billion per year)	Direct	10.2	11.1
		Indirect	11.0	11.9
		Total	21.2	23.0
	Global employment (number of workers employed)	Direct	44,000	78,000
		Indirect and induced	33,000	59,000
		Total	77,000	137,000
	Total wages paid to direct employees (worldwide, US$ billion per year)		2.7	4.6
Mn alloy	Economic contribution to the global economy (US$ billion per year)	Direct	~23	
		Indirect	~123	
		Total	~146	
	Global employment (number of workers employed)	Direct	67,000	86,000
		Indirect and induced	217,000	278,000
		Total	284,000	364,000
	Total wages paid to direct employees (worldwide, US$ million per year)		613	796

Source: RPA, 2015.

associated with a specific product, process or activity. It is an important tool for assessing the total contribution of a specific company, sector or activity to the economy, its overall impacts on society as a whole, and the trade-offs involved in any policy decision. Over the past decade, the use of SEA to support regulatory decision-making has grown and is playing an increasing role in the development of environmental and health protection legislation in the European Union (EU)[2] and elsewhere. Businesses and industry associations are also increasingly interested in measuring their socio-economic impact as part of maintaining their social license to operate, improving the business enabling environment, strengthening their value chains, and fuelling product and service innovation (PWC, 2013).

The scope of a SEA – what impacts are addressed and in what detail – can vary widely and guidance on its execution does not always specify what is required or what would be sufficient. Thus, a plethora of tools have emerged to assist businesses with measuring their socio-economic impact, all based on different assumptions, offering different functionality, focusing on different types of impact and suiting different purposes (PWC, 2013). Table 2 indicates the types of socio-economic impacts that are frequently considered. In the extractive industries, the use of SEA has been relatively limited to date, although interest in its use is clearly growing across the sector.

Mining companies will normally prepare economic impact studies when seeking to open a new mine. However, these generally focus on immediate impacts (such as number of workers to be employed, capital investments and corporation taxes) and, to date, have rarely been used to assess social and economic impacts up and down the supply chain. In 2000, Stilwell and Minnitt published a paper discussing the potential application of input–output analysis[3] to individual production facilities in the mining sector (Stilwell and Minnitt, 2000). Their paper explained the basic principles of input–output analysis, and presented an example of its application to a simplistic model of a mine, which was used in the absence of any real data. Kapstein and Kim (2011) provide a study of the socio-economic impacts of the Kenyasi mine operated by Newmont Ghana Gold Limited (NGGL) in the Brong-Ahafo Region of Ghana. For this study, the authors' gathered quantitative data from NGGL and used input–output analysis to generate estimates of the mine's effects on macro-economic variables such as employment, tax revenues, household incomes, the balance of payments, and supplier profits. The researchers also conducted interviews to gather qualitative information to assess NGGL's relations with its immediate community and with a variety of stakeholders within Ghana.

At the product level, SEA has been used by the Weinberg Group (2008) to assess the socio-economic benefits associated with the production and use of nickel in Europe. Unlike many preceding SEAs, the study included an analysis of the criticality and substitutability of nickel and nickel-containing materials in their various applications. More recently, SEA has also been used to assess the possible future benefits of mineral extraction. For example, a study conducted for the Ghana Chamber of Mines and The International Council on Mining and Metals (ICMM) (Steward Redqueen & African Center for Economic Transformation, 2015) brings together historic and forward-looking data from seven gold mining operations in Ghana to explore the past and projected, direct and indirect benefits of gold mining in Ghana.

3. The challenges in using SEA in the extractive industries

The extractive industries pose a particular challenge for undertaking SEA. In recent decades, global supply chains for essential raw materials have become increasingly complex. Minerals and metals may be extracted (in some cases by artisanal or small scale miners) and passed to local consolidators, before being traded between neighbouring countries and then shipped throughout the world. These trade routes are, however, highly dynamic and price volatility in the market for minerals/metals and political instability, amongst other factors, can lead to significant shifts in patterns of international trade. Smelters and other larger processors have also been identified as a critical point for supply chain traceability as they frequently combine materials from multiple sources. Down the supply chain, minerals and metals often find their way into patented technology and businesses may be hesitant to reveal information about their suppliers/purchasers for fear it could run counter to their business interests.

[2] Within the EU, for example, the REACH Regulation requires the use of SEA, under certain conditions, as part of the Authorisation process and strongly encourages Member States to prepare SEAs to justify proposed restrictions.

[3] The fundamental idea underpinning input–output methods is that sectors in an economy are linked through the demand for material inputs and the sales of intermediate output. It is these links or interdependencies that give rise to 'multiplier effects' across the economy when there is a change in economic activity. In the Mn industry, for example, output from the Mn ore industry (Mn ore) becomes input to the Mn alloy industry (Mn alloy), but also generates economic output in other sectors of the economy (e.g. in transport, energy, construction and so on). Input–output analysis is therefore a valuable method for estimating economy-wide impacts.