Journal of Cleaner Production 87 (2015) 489–500

Contents lists available at ScienceDirect

Journal of Cleaner Production

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

Classifying critical factors that influence community acceptance of mining projects for discrete choice experiments in the United States

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ARTICLE INFO

Article history:
Received 24 January 2014
Received in revised form
26 September 2014
Accepted 26 September 2014
Available online 14 October 2014

Keywords:
Mining
Community consultation
Community acceptance
Discrete choice experiments
Discrete choice modeling

ABSTRACT

Local community acceptance is a key indicator of the socio-political risk associated with a mining project. Discrete choice modeling could enhance stakeholder analysis, a critical step in community engagement. This paper seeks to identify and classify key mining project characteristics and demographic factors that influence individual acceptance of mining projects for discrete choice experiments. Six demographic factors were selected and project characteristics were classified into 16 characteristics, based on the literature. A survey of residents of mining and non-mining communities was used to test the hypothesis that these mine characteristics and demographic factors will influence respondents' decision to accept a proposed mining project.

Four (age, gender, income and education) of the six demographic factors were confirmed to be significantly ($p < 0.05$) correlated to respondent's ranking of the importance of the mine characteristics. These demographic factors are likely to be important explanatory variables of an individual's decision to support a mining project. All sixteen project characteristics are identified as important factors. The most important mining project characteristics were found to be job opportunities, water shortage or pollution, air pollution, and land pollution. Both groups of respondents reported similar opinions on 12 of the mining characteristics and differed, marginally, on infrastructure improvement, labor shortage for other businesses, noise pollution, and mine life. This result serve as a starting point for efficient choice experiment (survey) design and effective discrete choice modeling. These models can provide a viable framework for data-driven community engagement and sustainable mine management.

1. Introduction

Successful permitting and operation of mining projects depend on a good stable operating environment devoid of protests and acts of sabotage (legal or not). The operating environment depends, to a large extent, on the level of acceptance within the local community. The community's support or opposition is critical in obtaining permits prior to commencing mining. Actually, community acceptance is a requirement for the permitting process in some jurisdictions (e.g. Peru [1]). In the United States of America (USA), the local community's acceptance is not necessarily a requirement for granting a permit. However, public participation is required during environmental impact assessment. It is increasingly evident that community engagement is important for successful permitting of mining operations (indeed, for all industrial activity). There are numerous examples of mining projects that have been postponed, interrupted, and even shut down due to lack of public support (Browne et al., 2011; Davis and Franks, 2011; Moffat and Zhang, 2014; Prno and Scott Slocombe, 2012; Thomson and Boutilier, 2011). Project impacts that may contribute to this opposition are broad and, include environmental, social, and economic impacts.

This concept of community approval of mining operations and its relationship to socio-political risk has been formalized as the social license to operate, in the last decade (Thomson and Boutilier, 2011). The social license to operate (SLO) is defined as a community's perceptions of the acceptability of a company and its local operations (Thomson and Boutilier, 2011). SLO is inversely proportional to the level of socio-political risk faced by a mining operation. For instance, it has been shown that the time it takes for the major international oil companies to bring a project online nearly doubled in the decade preceding 2008, with the delay adding significant extra costs to projects (Goldman Sachs, 2008; Davis and Franks, 2011). Stakeholder-related risk has been shown

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[1] Peru passed a Law on the Right of Consultation of Indigenous Peoples in 2011 in accordance with various international conventions they had ratified.

http://dx.doi.org/10.1016/j.jclepro.2014.09.084
0959-6526/

to be one of the major non-technical risks responsible for these delays (Ruggie, 2010; Davis and Franks, 2011). For a mining project, the cost of delays can be equally significant. Davis and Franks (2011) estimates the delay cost to be approximately US$ 10,000/day, during the exploration stage of a new mine. These costs are even higher during production when the costs of labor, equipment ownership, and deferred production are much higher. From a company's standpoint, stakeholder (community) engagement is the best way to mitigate these stakeholder-related (community-related) risks.

Without proper or adequate stakeholder engagement, negative impacts (particularly, socioeconomic ones) are often increased and positive impacts are not fully realized, affecting the contribution of the mining project to sustainable development. In such situations, there are increased community protests leading, sometimes, to heavy handed government response (human rights and governance impacts). Negative impacts on cultural heritage can be significant in the absence of community consultation. Even a positive impact like job creation can be affected without proper consultation. Companies that fail to identify the needed capacity building cannot ensure higher local employment rates and participation of indigenes in the supply chain. Thus, there is a need for community engagement throughout the mine life cycle (exploration, development, exploitation and closure) to ensure sustainable development of the region that hosts the mine. This need is widely accepted and significantly impacts the success of corporate social responsibility (CSR) programs to deliver value to all stakeholders.

Organizations like International Finance Corporation (IFC) and International Council on Mining & Metals (ICMM) have discussed local community consultation in varying degrees (ICMM, 2008; ICMM, 2009; ICMM, 2010; ICMM, ICRC, IFC, 2011; ICMM, 2012; IFC, 1998; IFC, 2007; IFC, 2009; IFC, 2010a; IFC, 2010b). The literature contains many contributions to the discussion in this area (Azapagic, 2004; Davis and Franks, 2011; Gunningham and Sinclair, 2009; Jenkins and Yakovleva, 2006; Kempe, 1983; Moffat and Zhang, 2014; O'Faircheallaigh, 2012; Thomson and Boutilier, 2011). There is a burgeoning method that has developed for community engagement in the mining industry, which includes stakeholder identification, analysis and consultation.

The most widely used method for stakeholder analysis is suggested by the International Council on Mining & Metals (ICMM, 2012). This method requires the analyst(s) to evaluate each stakeholder's view of the project (positive, neutral, negative), how influential they are (high, medium, low) and how greatly they will be impacted by the project (high, medium, low). Stakeholders are then classified into three groups: highly influential supporter of the project, neutral about the project, and highly influential opponent of the project. The result of stakeholder analysis is very important in the stakeholder engagement process.

This stakeholder analysis procedure, currently in practice, is likely to remain the key evaluation process through which stakeholder opinions are assessed in a mining project. Results obtained by such analysis could, however, be complemented by the insights gained through other methods of analyzing customers' (stakeholders') preferences. Discrete choice theory (McFadden, 1974) provides a quantitative method for stakeholder analysis and has been successfully used in econometrics and other disciplines to understand consumer behavior, among others (Hensher et al., 2005; Train, 2002; Louviere et al., 2003). For example, discrete choice theory has been used to evaluate community acceptance of renewable energy projects (Dimitropoulos and Kontoleon, 2009) and assess people's preferences for railway transportation of hazardous materials (Winslott Hiselius, 2005). In these applications, a random sample of respondents are presented with a set of choices (which differ in the predetermined factors) to choose their preferred alternative. The data is then modeled using the most suitable discrete choice model. The interested reader is referred to Hensher et al. (2005) and Louviere et al. (2003) for a detailed discussion of discrete choice theory and experiments.

In mining, as far as the authors are aware, only Ivanova et al. have used discrete choice theory to understand the decision-making process of local communities regarding preferred mineral project development options (Ivanova et al., 2007; Ivanova and Rolfe, 2011). However, Ivanova et al. (2007) and Ivanova and Rolfe (2011) tracked very limited attributes of mining: five and seven mining project characteristics, respectively. Further work, with emphasis on identifying the key mining project characteristics from the plethora of candidate characteristics, is required to improve the reliability of discrete choice models and further refine how this approach can be used in community engagement. Also, for a meaningful application of discrete choice theory, three questions have to be answered: (1) How do you identify the important mining project characteristics for discrete choice experiments? (2) How do you find the key demographic factors, which are significant vis-à-vis people's perception of the importance of the mining characteristics? (3) Is there a difference between attitudes of people who live in mining and non-mining communities (i.e. people with and without significant mining experience)? Without answers to these three important questions, discrete choice modeling would not be efficient and effective, nor produce valid models to help with community consultation.

To bridge this gap, this paper provides a research note on a qualitative data collection process, with the aim of facilitating better choice experiment (survey) design for discrete choice modeling. Among qualitative methods, online surveys are useful in an initial exploratory or hypothesis-generating phase (Tey et al., 2012). The objectives of our online survey were to: (1) validated the authors' classification of mining project characteristics, which affect people's decision to support a proposed mining project; (2) identify the key demographic factors that will affect people's evaluation of project characteristics; and (3) test whether there are significant differences between attitudes of respondents who live in mining communities[2] and non-mining communities.[3] The authors conducted a literature review to identify six demographic factors and classify mining project characteristics into 16 independent factors that would affect community acceptance. Although the list of project characteristics that affect an individual's choice to support a mine or not can be long, the authors chose a classification system that balances environmental, social, and economic impacts, with a view on balanced choice experiments. The survey of residents of mining and non-mining communities was used to test the research hypotheses and evaluate the differences between the results of respondents living in mining and non-mining communities.

This work will be a significant contribution to knowledge and the literature on community acceptance in mining. The research provides preliminary results for effective and efficient discrete choice experiments and modeling. Section 2 presents a literature review to select relevant mine characteristics and demographics factors that influence individual attitudes of mining. Section 3 describes the online survey methodology. Section 4 presents the survey results and statistical analysis. Section 5 provides a discussion of the major findings. Finally, the conclusions from this work are presented in Section 6.

[2] Communities where there is significant mining and life is affected by mining activity.

[3] Communities where there is no significant mining and no significant impact of mining on life.