Dealing with controversies over gold mining projects: A case study from Greece

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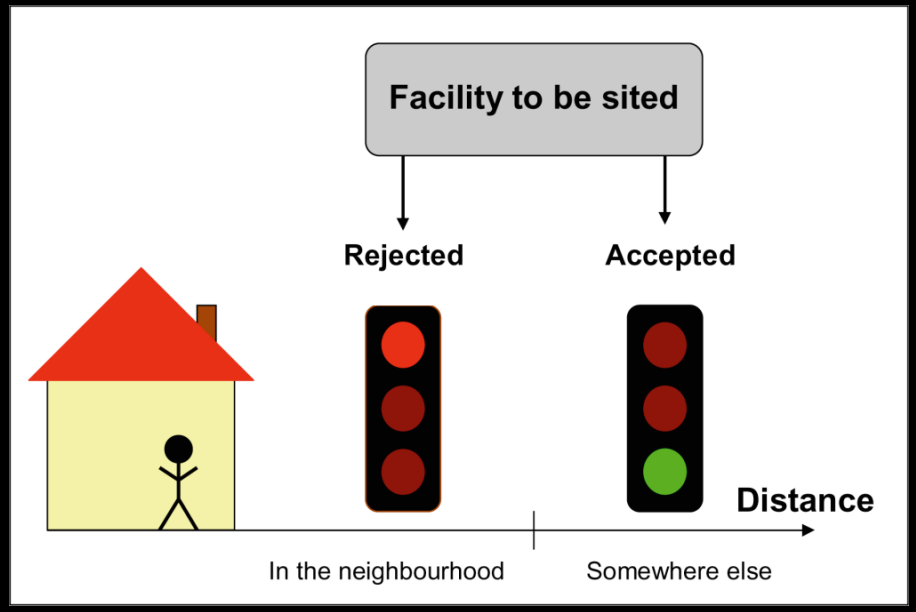
Mining activity & Siting conflicts

- Mining activity is faced with NIMBY reactions, since some adverse effects on the environment, both natural and man-made, are inevitable
- The NIMBY does not object to having the LULU facilities placed in another community. **But:** mining facilities must be sited where the deposits are found.



‘Compensation’ approaches

- It is widely accepted that local opposition is associated with economic costs attributed to the environmental and health risks and the decline in quality of life from the facility under consideration.
- An efficient and fair compensation could be used for addressing NIMBY concerns and persuade communities to host mining facilities.
- There is a need to justify the contribution of the project to the local and national economy and its external effects on the environment and the society, on an equal basis, in order to decide whether the exploitation is socially desirable.

Methodological approach

- This study aims at contributing to the public deliberation by providing a framework for evaluating the social worthiness of mining activities.
- The analysis uses ‘top-down’ and ‘bottom-up’ approaches emphasizing on the socio-economic effects and the externalities of the project to regional and national economy.

‘Top-down’ analysis

- Mining contributes to the economy by employing workers and generating income at the mine, and by creating links with other economic activities (e.g. purchase of supplies, electricity, stimulation of local production through spending of income earned at the mine, etc.).
- ‘Top-down’ analysis emphasizes on the direct, indirect and induced effects of mining to the regional and national economy.
- Direct effects are estimated through the Gross Value Added (GVA) of the project and the direct employment.
- Indirect and induced effects derive from output, income and employment multipliers that are estimated by means of Input-Output (I-O) tables of the national economy, via the Leontief inverse matrix.

‘Bottom-up’ analysis

- The ‘bottom-up’ analysis identifies and monetizes the external effects of the project on the basis of a Social Cost-Benefit analysis.
- The estimation of the external costs of the project involves the use of non-market valuation techniques.
- Primary environmental valuation survey is always the “first-best” strategy. However, primary research is not always possible due to time and/or cost constraints. Thus, the benefit transfer method was implemented, which is commonly adopted for completing a SCBA.

The Benefit Transfer method

- The BTM makes use of the results of one or more primary studies ("study site") to infer the values for the environmental impacts or benefits for the site of concern ("policy site").
- The characteristics of the environmental resource and the change incurred, the demographics between the populations and their cultural aspects, the kind of value (i.e. use, nonuse, or total) should be similar for the 'study' and the 'policy' sites.
- In some cases the transferred values are similar to the original estimated values, while in other cases, the disparity between was quite large.

Thus, the BTM cannot replace original research, especially when the costs of being wrong are high.

The ‘Perama’ gold mining project

The ‘Perama’ gold mining project

- The Perama Gold Project is located within a rural area, 25 km west-northwest of the city of Alexandroupolis in the Eastern Thrace of Northern Greece.
- The project is worth a total investment of over 120 million Euros and it will generate 200 direct jobs on a permanent basis.
- The deposit is amenable to conventional open pit mining. The contained gold and silver reserves are 0.966 Moz and 1.129 Moz, respectively.
- The adverse effects of the project include landscape degradation, removal of top soil, disturbance of fauna and flora, disruption of surface and groundwater systems, dust, noise and vibration nuisance on social and ecological receptors.

‘Top-down’ analysis results

Direct effects

- The Gross Value Added (GVA) of the project is 75.8 MEuros, which is decomposed in the following components:
  - Compensation of Employees: 7.6 MEuros
  - Royalty: 2.3 MEuros
  - Taxes: 18.9 MEuros
  - Gross Operating Surplus: 46.9 MEuros
- The GVA of the project in relation to the value added in regional economy is, as follows:
  - Region of East Macedonia and Thrace (EMT): 1%
  - Evros regional unit: 4%
  - Rodopi regional unit: 5.7%
  - Regarding the secondary sector, the increase of the GVA is estimated to 7.5% for EMT, 52.4% for Evros and 38.4% for Rodopi, accordingly.

Indirect and induced effects

‘Metal ores’ mining branch multipliers

Economic impact	Type I	Type II
Output multiplier	1.399	2.047
Income effect	0.258	0.310
Income multiplier	1.350	1.632
Employment effect	3.5E-05	5.2E-05
Employment multiplier	1.181	1.770

Indirect and induced effects

- Income effects: a change of €1 in income from employment creates €0.35 considering indirect effects and €0.63 when induced effects are included. Given that 'Compensation of Employees' is about 7.6 MEuros, an additional income of 4.8 MEuros will be created due to indirect and induced effects.
- Employment effects: a new job created in metal mining results in 0.18 jobs considering indirect jobs and 0.59 induced jobs. Thus, for the 200 jobs created in Perama project, 36 indirect jobs and 118 induced jobs are created in Greek economy.

‘Bottom-up’ analysis results

Externalities

The analysis took into consideration the following effects:

- Impacts on employment: The ‘shadow wage’ approach was adopted and an annual average ‘benefit’ of 3.758 MEuros was estimated.
- Taxes paid out of earnings: Cash flows were adjusted for corporate and other taxes.
- Environmental externalities: the valuation of the environmental externalities was carried out by means of Benefit Transfer (BT) method considering different alternatives, under ‘normal’ conditions and under the case of a major environmental accident.

Environmental externalities – 'Normal' conditions

- Scenario A: Simultaneous approach

  The project is evaluated as a NIMBY activity and all the externalities were estimated simultaneously.

  Estimated cost: 2.8 MEuros(2011) per annum

- Scenario B: Additive approach

  The environmental impacts of the project are assessed separately and then the estimated costs are added.

  Estimated cost: 505,000 – 890,000 Euros(2011) per annum

Environmental externalities – Major accident

- Scenario C: The case of a major accident

  The effects of a major environmental accident, namely dam failure, are estimated using the results of the risk assessment studies prepared for the mining project.

  Estimated cost: 257 MEuros(2011) in terms of PV, using the maximum reference value for safety reasons

SCBA results – Deterministic analysis

- ‘Normal’ operation conditions

  The analysis of the project provides a social NPV of 310.9 MEuros(2011) and a social IRR equal to 49.9%.

- Major accident situation

  Given that the probability of dam failure is very low (3.13E-6) the results remain almost identical, since:

$$SNPV = (SNPV_{normal\ oper} * p_{normal\ oper}) + (SNPV_{accident} * p_{accident})$$

SCBA results – Probabilistic analysis

- Parameters used: gold price and external cost
- The Social NPV has mean value of 361.8 MEuros and a 90% probability of exceeding 239.4 MEuros.
- The Social IRR has mean value of 55.5% and a 90% probability of exceeding 41.2%.
- The economic indices are mainly affected by the price of gold. For instance, the social NPV for a ±20% change of the input parameters ranges between 192.2 and 429.6 MEuros for the gold price and between 307.2 and 314.6 MEuros for the environmental cost, respectively.

Conclusions

- The methodology presented provides the means for evaluating mining projects on the grounds of sustainability and, thus, it may stimulate discussions between the stakeholders involved.
- The project is considered to be socially worthy from an economic standpoint, although the analysis was based on conservative assumptions.

However….

Does compensation always work?

In many cases people state that "*money is not enough*". Why?

- **'Bribe effect':** compensation offers may be regarded as bribes, if individuals incur moral costs by publicly showing that their approval can be bought.
- **'Crowding-out' of public spirit:** Citizens may vote in favor of hosting noxious facilities if they feel that it is their duty to contribute to the social well-being. Monetary compensation may lower acceptance levels for a LULU facility because monetary rewards deprive individuals of the possibility of enjoying altruistic feelings.

Is the analysis meaningful?

The results of such an analysis may have a practical meaning only when a set of strict assumptions is met:

- The private actor should implement exactly the environmental and technical studies of the project.
- Government and regional authorities should monitor the local and regional environmental quality, in order to assure that the company fulfills its environmental obligations.
- The project should be insured against a catastrophic event to cover environmental liabilities.
- The project should meet the acceptance of the local community, otherwise the outcomes, especially those based on value transfers, are pointless.

Thank you very much for your attention…