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# Using Force Field Analysis for Examining and Managing Stakeholders' Perceptions of Mining Projects †

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**Abstract:** This article uses force field analysis (FFA) to examine the role of stakeholders in the lignite mining project of the Western Macedonia Region, Greece, which is entering the closure phase at an accelerated pace due to energy transition policies. The FFA is applied in four steps: identification of internal and external stakeholders; classification of them into groups according to their interest and influence on the project; assessment of each stakeholder's strength in quantitative terms and graphical representation of it in a force field diagram; and management of stakeholders' perceptions. The result of this article is the determination of a specific course of action that balances the benefits and impacts for all stakeholders.

**Keywords:** surface mines; mine closure; society; impact assessment; Western Macedonia



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## 1. Introduction

The role of the mining industry is undoubtedly vital for global economic growth, while at the same time and under certain conditions, it is decisive to regional and local development. However, the practices applied in the past for the exploitation of mineral resources, which led to significant degradation of the environment, have formed a negative attitude of the parties involved in every mining project. In this context, Corporate Social Responsibility (CSR), Social License to Operate (SLO) and stakeholders' management are strategic choices for the mining industry that can contribute to the effective management of a whole project or its components, from the deposit exploration to the mine closure and land reclamation.

In general, stakeholder theory has been developed over the last 30 years to reconceptualize the problems of value creation and trade in a world where there is a great deal of change in business relationships, the ethics of capitalism, and managerial mindset that puts business and ethics together to make decisions on a routine basis [1]. Stakeholder theory posits that firms are responsible for delivering benefits to all their stakeholders rather than only to shareholders and customers. Stakeholders are defined as the individuals and constituencies that contribute in numerous ways to companies' wealth-creating capacity and activities and are, therefore, potential beneficiaries and/or risk bearers [2]. Mitchell, et al. [3] derive a typology of stakeholders based on the following attributes: (i) power, the extent a party has means to impose its will in a relationship; (ii) legitimacy, socially accepted and expected structures or behaviors; (iii) urgency, time sensitivity or criticality of the stakeholder's claims. By examining the combination of these attributes in a binary manner, eight types of stakeholders are derived, along with their implications for the organization.

Focusing on the extractive industry, a literature review conducted by Rodrigues et al. [4] examined the growth trajectory, influential documents, and conceptual framework of stakeholder engagement in the mining industry. The bibliometric survey conducted using 149 documents highlighted the most studied aspects of sustainability, management and legitimacy concerns, the importance of local communities and other stakeholders, and the social impacts of mining [4]. Furthermore, the managers of mining companies usually perceive their main responsibility to be respecting the interests of stakeholders directly affected by the project. They view the company's obligations to stakeholders as primarily negative, aiming to avoid harm rather than actively promoting their social development or welfare in line with their cultural traditions. The managers often frame their decision-making as pursuing organizational objectives within constrained environments rather than explicitly addressing ethical values [5]. There are also mining companies that prioritize financiers, authorities, and employees as key stakeholders, while communication and interactions with politicians and the local community are fragmented. However, the stakeholder identification should be dynamic and regularly updated, emphasizing an industry and site-specific context [6].

In this framework, since stakeholders' management in a mining project is equivalent to a problem of driving strategic initiatives and managing change (e.g., of productive activities or land uses), Lewin's Force Field Analysis (FFA) can be proven to be an effective tool for guiding the relevant decision-making [7]. FFA is applicable in various domains, including organizational development, strategic management, environmental strategy adoption, and intellectual capital management [8]. Shurville, et al. [9] use FFA in the case of flexible learning in higher education and emphasize the constant commitment to change and innovation management. Toves et al. [10] address the effective management of technology-enabled change using FFA and reveal the significance of issues related to communication, training misconceptions, and false assumptions about computer literacy. Capatina et al. [11] introduce a conceptual framework based on FFA for managing intellectual capital assets in software development companies. Mak et al. [12] focus on the hotel industry in Taiwan, where FFA was used to explore the adoption of various environmental protection strategies. Finally, Erol, et al. [13] explore the driving and restraining forces for circular economy adoption in Turkey's solar power sector; the total score of restraining forces is higher than that of driving forces in FFA, with the most prominent restraining force being the absence of effective incentives and regulations.

In the context of mining projects, FFA can be a valuable tool for stakeholder management, enabling project managers to navigate complex stakeholder landscapes, mitigate risks, and foster sustainable relationships with diverse stakeholder groups. It is possible to support responsible mining practices and post-mining land uses by considering the interests and concerns of stakeholders and ensuring their meaningful involvement throughout the project lifecycle.

## 2. Method

FFA is a framework developed by the social psychologist Kurt Lewin in the 1940s [7]. The idea behind FFA is that situations are maintained by an equilibrium between forces that drive change and others that resist change. For change to happen, the driving forces must be strengthened, or the resisting forces weakened. Hustedde and Score [14] provide a general overview of FFA as a decision-making tool; it describes the process of identifying driving and restraining forces, selecting key forces for potential alteration, and assessing the balance between them to determine the feasibility of pursuing goals.

FFA is carried out in the following steps [15]:

*Description of the proposal for change.* The lignite mining, in combination with thermal power plants located in the center of Western Macedonia was the main pillar of Greece's power generation system for more than six decades. Nowadays, the lignite mines enter the closure phase at an accelerated pace due to the energy transition strategies. Although a land reclamation plan is described in the relevant permit, all the involved parties agree

that a new plan is required to mitigate social and economic impacts on local communities. However, the so-called Just Development Transition Plan and the proposed actions it contains have not been equally accepted by the stakeholders. In the following sections, the attitude of the stakeholders is analyzed from the point of view of a mining company.

*Identification of driving and restraining forces.* In the above-described case, driving forces are considered the stakeholders. Internal stakeholders are those working in the mining company, either as individuals or as unions. In contrast, external stakeholders are entities outside the mining company, such as local authorities, NGOs, and the government. Nevertheless, another useful classification is the one proposed by Reed, et al. [16], which is based on the stakeholders' interest and power of influence: stakeholders with high interest and power are characterized as 'key players', those with high interest but low power as 'subjects', those with high power but low interest as 'context setters', while those with both low power and interest are characterized as 'crowd'.

The stakeholders' perception is analyzed separately for each action or initiative proposed in the framework of the Just Development Transition Plan.

*Assignment of scores for each force.* Although FFA is primarily a qualitative tool, it is possible to derive quantitative results by assigning numerical scores to stakeholders' interests and power of influence for each action or initiative planned. In the examined case, the scores have been assigned by the authors considering the opinions that stakeholders have expressed in public media and committees dealing with the formulation of programs for financial support and the evaluation of investment proposals. The validity of this method depends on the subjective judgement of the authors, as it is not possible to use objective measurements. The scale of $-5$ to $+5$ is a typical scale for FFA allowing the determination of small and large differences between stakeholders' interests and power of influence for each action or initiative planned.

*Analysis, planning, and implementation of a strategy to strengthen driving forces and overcome restraining forces*.

## 3. Results

### *3.1. Identification of Stakeholders*

In a surface mining project, several stakeholders may have an interest in or be affected by the mining operations. The key stakeholders in the case of the lignite mines of the Western Macedonia Region are the following:

*Local Communities (S1)*: The communities living in proximity to the mining site are important stakeholders. They may be affected by the project's environmental, social, and economic impacts, such as changes in land use, noise, dust, and potential disruptions to their way of life.

*Government Authorities (S2)*: Government agencies at various levels, including local, regional, and national, have an interest in regulating and overseeing the operation of the mines, which is closely related to energy security. These authorities are responsible for the enforcement of regulations that encourage investments in RES and describe the way decarbonization will be just for all the parties affected. They may be involved in granting permits, enforcing regulations, and monitoring compliance with environmental and safety standards.

*Regulatory Agencies (S3):* Government bodies responsible for overseeing mining operations, such as environmental agencies, mine safety agencies, and mining regulators, are stakeholders in ensuring compliance with laws and regulations. They may be involved in granting permits, enforcing regulations, and monitoring compliance with environmental and safety standards.

*Local chambers and societies (S4)*: Although with limited power, they are asked to express opinions in several stages of the mining projects' development and operation, affecting in this way the relevant decisions.

*Environmental Organizations (S5)*: Non-governmental organizations (NGOs) and environmental advocacy groups often play a role in monitoring the environmental impact

of mining projects. They advocate for sustainable practices and ensure compliance with environmental regulations.

*Shareholders and Investors (S6)*: Shareholders and investors in the mining company have a financial stake in the project's success. They are interested in the company's profitability and long-term sustainability.

*Unions and Federations of Workers (S7)*: The workers' concerns revolve around workplace safety, fair wages, labor conditions, and job security. However, their main concern is the offer of decent jobs after the changes that will take place.

*Suppliers and Contractors (S8)*: Companies providing goods, services, and equipment to the mining project are stakeholders. Their business depends on the mining operation's success and continuity.

*Financial Institutions (S9)*: Banks, lenders, and financial institutions that provide funding or loans for the mining project are stakeholders with a financial interest in the project's viability.

*Media and Public (S10)*: The media and the public have an interest in understanding the social, economic, and environmental impacts of the mining project. They can influence public opinion and raise awareness of any concerns or issues.

### *3.2. Classification of Stakeholders*

As it has been described in the section on methodology the stakeholders are classified into four groups according to their interest and power of influence: *Key-players*: Governmental authorities; *Context setters*: Regulatory agencies, financial institutions, and shareholders and investors; *Subjects*: Unions and federations of workers, local communities, local chambers and societies, and suppliers and contractors; *Crowd*: Media and public and environmental organizations.

### *3.3. Analysis of Stakeholders' Strength*

For each of the 12 proposed policies included in the just transition plan under consideration, a field of forces was created, considering stakeholders as forces driving or resisting the proposed change. For instance, Figure 1 illustrates the force field in the case of the construction of renewable energy parks in the reclaimed mine lands and the wider area of the lignite mines. Moreover, Table 1 presents the numerical scores determined for all stakeholders and policies and initiatives (P and Is) combinations. The central columns in Table 1 contain the sums of driving (DFs) and resisting (RFs) forces as well as the algebraic sum of all forces (Δ) that ultimately indicates what the prevailing trend is for each P and I.

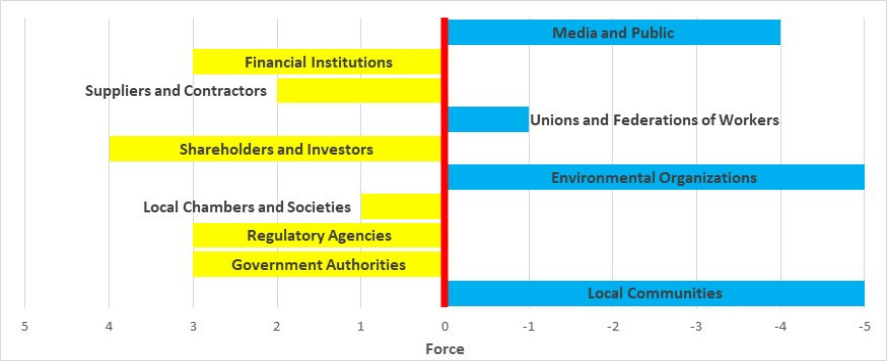


**Figure 1.** Field of forces that drive (yellow) or resist (blue) the construction of renewable energy parks in the wider area of lignite mines.

**Table 1.** A quantitative approach to the driving and resisting forces exerted by the stakeholders (S1–S10) for each examined policy and initiative (P and I).

| | **Driving Forces** | | | | | | | | | | | | **Restraining Forces** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Policies & Initiatives (P&Is)** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | **DFs** | **Δ = DFs − RFs** | **RFs** | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 |
| P&I–1 Agro–Economy & Livestock | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | **15** | **15** | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P&I–2 Renewable Energy | 0 | 3 | 3 | 1 | 0 | 4 | 0 | 2 | 3 | 0 | **16** | **1** | **−15** | 5 | 0 | 0 | 0 | 5 | 0 | 1 | 0 | 0 | 4 |
| P&I–3 Green Hydrogen Production | 1 | 2 | 1 | 4 | 0 | 4 | 3 | 2 | 3 | 2 | **22** | **21** | **−1** | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| P&I–4 Forestation, Ecosystem Restoration | 3 | 3 | 3 | 2 | 5 | 2 | 1 | 0 | 3 | 4 | **26** | **26** | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P&I–5 Industrialization | 3 | 3 | 2 | 4 | 3 | 3 | 4 | 1 | 3 | 3 | **29** | **29** | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P&I–6 Reclamation | 1 | 2 | 2 | 2 | 0 | 3 | 2 | 2 | 3 | 0 | **17** | **12** | **−5** | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 2 |
| P&I–7 Lignite–based energy production | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | **4** | **−24** | **−28** | 4 | 1 | 4 | 4 | 5 | 0 | 0 | 0 | 5 | 5 |
| P&I–8 Tourism, Recreation & Sports | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | **7** | **5** | **−2** | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| P&I–9 Industrial heritage | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | **9** | **9** | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P&I–10 Lignite mining | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | **4** | **−21** | **−25** | 0 | 2 | 2 | 2 | 5 | 0 | 5 | 0 | 4 | 5 |
| P&I–11 Energy crops and biomass combustion | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** | **−13** | **−14** | 3 | 0 | 0 | 1 | 4 | 0 | 3 | 0 | 0 | 3 |
| P&I–12 Waste management facilities | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | **2** | **−12** | **−14** | 3 | 0 | 0 | 1 | 4 | 4 | 0 | 0 | 0 | 2 |

Note: Zero values are applied for proposals that stakeholders show either opposite or indifferent attitudes.

### *3.4. Stakeholders Management*

Based on the algebraic sums Δ of the forces, it is possible to classify the policies and initiatives into four categories, which are illustrated in different colors in Table 1:

*25< Δ <50 (green)* P and Is supported by numerous stakeholders. For these P and Is no action must be taken. However, a failure to implement them can create frustration and negative reactions from stakeholder groups with high expectations.

*0< Δ <25 (yellow)* P and Is that either have the mild support of a few stakeholders or are supported by some stakeholders but, at the same time, there are other groups that resist. In the later cases, such as the construction of renewable energy parks, stakeholders' management is required mainly to remove the restraining forces.

*−25< Δ <0 (pink)* The P and Is on which stakeholder management should be focused, both to strengthen the driving forces and overcome the restraining ones. Any decisions depend on the point of view from which all policies and initiatives are considered. For instance, it is apparent that the 12 P and Is under investigation do not have the same importance for a mining company. The operation of lignite-fired power plants (P and I-7) is out of consideration due to the competition of cheaper energy sources, while the development of waste management facilities (P and I-10) is possible to create new opportunities for synergies based on the circular economy and sustainable development principles.

*−50< Δ <−25 (no P and Is within this range)* P and Is that are strongly opposed by many stakeholder groups. The attempt to change the attitude of these P and Is will probably be fruitless. It is preferable to revise or even abandon them.

## 4. Discussion and Conclusions

Based on the above presented results of the FFA, it is possible to map the stakeholders of the project concerning the development of policies and initiatives to mitigate the social and economic impacts of the lignite mine's closure in the Western Macedonia Region. Local communities, environmental organizations and media are those stakeholders that oppose specific policies. The interest of the last two groups (crowd) is probably low, and that of local communities is huge since they are the ones who will suffer the impacts (subjects).

In this context, the project managers of a mining company must determine the appropriate strategies for the engagement of stakeholders: It is the mining company that is in daily friction and conflict with local communities. For this reason, it is crucial to establish a channel of communication with its representatives based on mutual understanding and acceptance of the positions of the two sides. In addition, the mining company needs to be in constant collaboration with key players, such as the governmental authorities, to influence political decisions in the direction of the fair and technocratic treatment of problems, as well as with context setters, such as the regulatory agencies, to interpret the regulatory framework in a way that supports the implementation of innovative proposals capable of boosting the regional development. Moreover, this approach can significantly reduce the potential risks associated with stakeholders. By considering the power and interest of stakeholders, project managers can assess the likelihood and impact of stakeholders posing risks and mitigation plans can be developed to address these risks.

Field Force Analysis (FFA) can be applied in projects relevant to stakeholder management. FFA is a tool used to analyze and understand the dynamics and influence of stakeholders in a particular project or initiative. It helps project managers identify key stakeholders, assess their level of interest and power, and devise strategies to effectively manage their involvement and support.

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