SUSTAINABLE BUSINESS STRATEGIES DEVELOPMENT: DOES THE MINING INDUSTRY PROMOTE ECONOMIC GROWTH

Abstract:
The global economy has moved in the direction of more sustainable development to achieve future prosperity. Almost all possible industries have gotten in the way of sustainable development, including the extractive or mining sector, traditionally associated with negative environmental and socio-economic impacts. The transition to a green economy is impossible without the use of metals and minerals, so we observe an increasing demand for mining around the world. Can the inevitable damage to the environment be offset by the contribution of the mining industry to sustainable development? - this issue needs a profound analysis. This paper aims to assess the possibility of sustainable business strategy development in the extractive sector and to investigate the impact the mining industry may have on the regional economic development in the framework of SDG-8.

Keywords:
Sustainable business development, economic growth, mining industry, regional economic development, SDGs

Since 2015, when the United Nations adopt a complex agenda by 2030 [1] including list of The Sustainable Development Goals (SDGs), numerous countries and economic industries make efforts to incorporate them into their development strategies. The extractive or mining industry is not an exception. The transition to the green economy has significantly increased the demand for metals and minerals that are needed to produce solar panels, wind turbines, electric vehicles, battery storage, etc. However, an increase in mining turnover is inevitably associated with environmental damage.

Mining projects are facing more and more criticism related with public discussions about the negative effects of the extraction of non-renewable resources, so companies experience a substantial pressure from stakeholders and try to strike a balance between corporate and economic interest and socio-environmental values. Companies in their strategies most frequently emphasize that they are able to offset their negative impact by contributing to the achievement of sustainable development goals. Besides minimization of greenhouse gas emissions, waste management, water management, circular economy incorporation, use of renewable energy sources, and other
measures linked with the various SDGs they focus on the contribution to the sustainable economic growth, employment, and provision of decent work (SDG-8).

The question is whether the activities of mining companies actually contribute to regional development and how the promotion of this aspect in sustainable business strategies is justified. The results of previous studies in this field are contradictory and dramatically differ between studies using qualitative and quantitative analyses.

Thus, the analysis of cases and individual experiences of companies from different countries [2–9], as a rule, allow us to draw optimistic conclusions about the future of sustainable development in the mining sector. Whereas a quantitative study [10–12] of the influence of the industry on the economic development of the country and its regions showed that the growth of the industrial sector does not have a significant impact on economic growth. The abovementioned gives us grounds for studying the formerly found phenomena and effects in the context of other countries.

In order to analyze the real prospects for sustainable mining and explore how the sustainability elements could be incorporated into the mining company’s business strategy, we turned to the best practices of Finland, a country with a strong mining industry, and, at the same time, to the country – the global leader in SDGs goals achievement.

This paper employs annual data collected for the period 2011-2020 across 23 mining projects in Finland and corresponding statistics across 12 regions where selected projects are implemented. The industries data on mined volumes was obtained from the Finnish Safety and Chemicals Agency (Tukes) [13], regional data from National Statistical Service [14].

Finland is among a number of European countries with the most developed mining industry. The dynamic of the metal ores mining turnover development in Finland (Figure 1) displays tendency to growth in the last 10 years, the same is for dynamic of turnover in mining supporting industries.

The soil of Finland is rich in many valuable ores. The main metals mined in Finland are copper, nickel, zinc, platinum, sulfur, cobalt, chrome, gold, and lead. The part of these minerals serves as a battery raw material (nickel, cobalt, lithium, and graphite). So, Finland, along with very few countries supplying these materials, is built into the global value chain of battery production, which are essential for a technologically advanced low-carbon society and achievement some of the sustainable development goals.

The mining industry in Finland have moved towards sustainable development since the beginning of 2010s and made an evident progress in this regard. In the recent years there were
several studies [15], [2], [3], [5] intended to assess to what extent it was introduced elements of sustainability into the strategy for the development of the mining industry and how it affected extractive business performance in the country.

Figure 2. Cyclical development of the employment in 2010–2020 (Index 2015 = 100)

Deposits of metals and other ores are concentrated mainly in the northern part of the country, with some of the largest projects located beyond the Arctic Circle. The remoteness of the industry from the central more economically developed regions determines the peculiarities of Finnish companies’ business strategies in which a contribution to the regional socio-economic development is highlighted as one of the primary components in the movement towards sustainability. So, the issue of the mining industry's contribution to regional economic development is relevant for the Finland.

Based on the previous studies [10], [11], [16], we suppose that the total output of the mining project impacts the gross regional product in the region it is implemented in; and that the indicators related to the mining industry may determine regional economic development. To evaluate these hypotheses, we built a model, represented by the following equation:

\[
\text{LNGRP} = \beta_0 + \beta_1 \cdot \text{LNTW} + \beta_2 \cdot \text{WORKH} + \beta_3 \cdot \text{LNGFCF} + \beta_4 \cdot \text{VADD};
\]

The list of variables and their corresponding acronyms (variables' names) are presented in Table 1. The dependent variable in this analysis is the value of Gross Regional Product (GRP) for the region in which the corresponding company’s mining project is located.
Table 1 – Correspondence of a variable and its meaning in models and analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Acronym</th>
</tr>
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<tbody>
<tr>
<td>Gross Regional Product(s) in corresponding mining area(s) in constant 2010 prices, euros</td>
<td>LNGRP</td>
</tr>
<tr>
<td><strong>Independent variables</strong></td>
<td></td>
</tr>
<tr>
<td>Total output of the mining project, tonnes</td>
<td>LNTW</td>
</tr>
<tr>
<td>Worked hours in mining and quarrying industry by region(s) of operations, 1000 people / 1 000 000 hours</td>
<td>WORKH</td>
</tr>
<tr>
<td>Gross fixed capital formation, expenditure in the mining sector by region(s) of operation, euros</td>
<td>LNGFCF</td>
</tr>
<tr>
<td>Value added of mining and quarrying sector output in the operational region(s), at previous year's prices, euro</td>
<td>VADD</td>
</tr>
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If the company's activities are located in several regions, then the values of indicators for all regions of operations are summarized and presented as a single value. The values of independent variables: Worked hours in mining and quarrying industry by regions of operations; Gross fixed capital formation, expenditure in the mining sector by region of operation; Value added of mining and quarrying sector output in the operational region, — they were obtained in the same way. The last independent variable characterizes the company’s annual mining performance: total output (т), i.e. a total ore volume mined from a particular project.

The further analysis was based on the Fixed effect (FE) model adjusted for heteroskedasticity as the most suitable for this dataset. The results of the regression are represented in the Table 2.

Table 2 – Fixed Effect model adjusted for heteroskedasticity

| LNGRP | Coef. | Robust Std. Err. | t     | P>|t| | [95% Conf. Interval] |
|-------|-------|------------------|-------|-----|----------------------|
| LNTW  | .0003433 | .0014105 | .24 | .810 | -.0025818 | .0032685 |
| WORKH | .0152647 | .1608557 | .09 | .925 | -.3183296 | .348859 |
| LNGFCF | -.0012766 | .0130948 | -.10 | .923 | -.0284335 | .0258803 |
| VADD  | 5.54e-10 | 1.77e-10 | 3.13 | .005*** | 1.86e-10 | 9.22e-10 |
| cons  | 22.67525 | .2574174 | 88.09 | 0.000*** | 22.1414 | 23.2091 |

Notes: *, **, and *** denote 10%, 5%, and 1% levels of significance, respectively

Among the explanatory variables, only value added of mining and quarrying sector output in the operational region(s) (VADD) turned out to be significant at 1% level while the rest of the experimental variables are insignificant. Regardless of the influence of the variables included in the model, the GDP of the regions in Finland will increase by 23%, which indicates the presence of omitted, but significant variables in the model.

Regarding the rest of the variables which are insignificant, we could infer that Gross Regional Product in the areas of mining projects does not depend on the mining companies’ output, the employment rate in the industry as well as on gross fixed capital formation in the mining sector. Such results partly correspond to the previous findings made by [10], [11], but there is a need for the refinement of the model specification and expansion of the sample to the country level to make unambiguous conclusions.

Nevertheless, the current model’s results indicate that the value added by mining and quarrying industries has a positive impact on regional economic development i.e. contribution of this economic sector is significant for Finland's regional development, though it is tiny. If we glance at the value-added activities in the mining sector, we will find that their range is relatively restricted in comparison with other economic sectors.
Moreover, companies trying to gain a competitive advantage by adding value inevitably face problems such as commodity prices volatility, capital scarcity, relatively low productivity with high mining costs, socioeconomic challenges associated with non-renewable resources extraction, waste, and mines closures issues along with environmental damage. In particular, mining involves an extraction of a wasting mineral resource whose value declines with each unit of extraction (T. Tholana [17]). Those, Mining companies are left with no other option to maximize value but the maximization of ore extraction which adversely affects the state of the industry and puts an obstacle in incorporation of sustainability in business strategies of mining projects.

In the case of Finland, the most obvious way to increase the added value of the mining industry at the moment is the development of battery production in the country. Based on its mineral resources Finland has the potential to fill the cathode material needs of one large electric vehicle battery plant. It could turn Finland into a key supplier for several electric car manufacturers in Europe which respectively will stretch the original value chain of the mining industry by adding new activities.

Thus, mining companies extracting metals necessary for the production of batteries can position themselves as part of the global renewable energy development chain. It can serve as a foundation for incorporation of sustainability in business strategy and enhance the trust and loyalty of stakeholders.

Furthermore, investing in the production of renewable energy sources, research into their development, as well as building partnerships with large plants already operating in Europe, will make it possible for mining companies to really contribute to sustainable development directly, and indirectly, by stretching the value chain, to regional economic development in Finland.

Therefore, the example of Finland shows that the formation of a sustainable business strategy as part of the contribution to regional and national economic development should occur through the search for new ways to create value for both the company and society.

Total output of the mining projects, employment indicator and Gross fixed capital formation in the mining turned out to be insignificant, so we can conclude that these factors do not have any significant impact on the regional economic development. Thereby, the current model specification does not depict any evidence that mining intensity could serve as a determinant for economic growth in the Finish regions which coincides with analogical findings in previous studies.

The negligible contribution of the value-added to the regional economic development might be caused by specific of the value-added activities in the mining sector, in particular, the fact that their range is relatively restricted. However, we have every reason to believe that affect gross regional product's growth through the acceleration of economic activities in the region. The remaining controversial aspects of this work require further in-depth analysis and changes in the model specification in order to get more valid results.

REFERENCES
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