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Analysis and Verification of Space for New Businesses in Raw Material Market—A Case Study of Poland

Marta Sukiennik * and Barbara Kowal

Faculty of Civil Engineering and Resource Management, AGH University of Science and Technology, 30-059 Kraków, Poland; bkowal@agh.edu.pl

* Correspondence: martas@agh.edu.pl

Abstract: This article presents an approach to the diagnosis of the business area for new entities on the raw material market in Poland. In the face of the need for changes as a result of the assumptions of the Green Deal and the global transformation of production processes toward a sustainable approach and circular economy, a diagnosis was made of the area that can be explored by new entities in the raw material industry. After the diagnosis of this area, a PESTEL analysis was carried out, which may contribute to a better definition of business goals and the scope of activities for new entities on the market or those who want or need to change industries. PESTEL is an analysis aimed at assessing the macroeconomic environment of a company. It helps in making strategic decisions for the enterprise. The research results presented in this article are part of a project implemented as part of an international cooperation within the V4 countries. In each of them, there is a defined market of mineral resources that can be used by local or foreign entities. The business gap diagnosed in the mineral resource market in Poland, i.e., broadly understood activity in the IT area, may be an indication for potential investors to start new business activities. Additionally, the PESTEL analysis carried out allows the definition of the requirements for the determinants of the business under consideration.

Keywords: raw materials; PESTEL analysis; v4; Green Deal; entrepreneurship; new business models of energy and mining

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1. Introduction

Individual countries and regions of the world are characterized by different levels of development. The pace of economic and social development in the world has varied greatly over the last few decades. These differences are visible by country, with dynamically developing areas having a high national income per capita and with poorer countries lagging behind, where industry is almost non-existent and the standard of living of the population is very low. In recent years, many developing countries have succeeded in bridging the gap that separates them from highly developed countries. However, there are still countries where the situation has not improved or has become even worse [1]. This situation was certainly influenced by China's accession to the World Trade Organization in December 2001. Their development initiated wide structural changes in industrial markets [2]. It cannot be denied that the economic development of countries mainly depends on stable and constant access to various energy sources [3]; therefore, the production of mineral resources plays and will continue to play an important role in shaping the world economy [4]. Having their own raw material resources gives nations significant independence and ensures energy security, which is gaining in importance as the demand for energy, energy resources, and fuels is constantly growing [5–10]. In addition, this shapes the industrial development of a given country and the direction of the technologies being introduced there, thus giving the possibility of sustainable and uninterrupted development [3–7,11–14].

It should be noted that the integration of India, China, and other industrialized countries such as Brazil, Turkey, and Mexico meant that the economies of these countries

account for more than half of the world's population; thus, they demand an increasing share of raw materials. This situation causes increasing competition for a share in the global supply of mineral resources among these countries and the United States of America, Japan, and Europe [2].

INTRAW [2] carried out a scenario approach (a well-established foresight methodology for supporting medium- and long-term planning in companies, industries, and at the policy level) that resulted in the development of three future scenarios for the commodity world in 2050: sustainability alliance (the new generation puts sustainability above all else to preserve a deposit for future generations), unlimited trade (increased global consumption leads to increased use of raw materials), and national walls (economic stagnation breeds nationalist politicians and protectionist measures). The first two scenarios seem to have started to materialize already because:

- The circular economy is slowly becoming the norm in advanced economies [15];
- Access to capital has led to industrial integration, technology development, and efficiency improvement;
- Green technologies have emerged,
- Many laws and reforms have entered into force that focus on increasing sustainable development, and not only in the raw materials industry;
- Population growth has resulted in increased global consumption of raw materials.

In view of the above, it can be seen that the implementation of the scenarios will not be possible without international cooperation, and even more so as outlays from other sectors, such as services, are a great opportunity for some countries that are rich in minerals [16].

However, the last two years and the appearance of COVID-19 have caused a change in the mineral resource market. The pandemic and successive lockdowns dealt a devastating blow to the global economy: They disrupted supply chains, significantly reduced the demand for raw materials, including oil and gas, and caused uncertainty in economic, social, environmental, and political conditions. The crisis in the raw material market caused panic on the oil market, and global prices dropped to USD 20 or 10 per barrel; however, fuel was cheaper by only a few tens of cents at stations, and there was uncertainty as to the scale of the extinction of activity, which translated into a significant decrease in electricity demand in many areas [17,18]. The sharp pandemic-induced fall in commodity prices did not last long. Worldwide commodity prices of oil, gas, and coal are high again and continue to rise. Many countries are gearing up for a post-pandemic recovery. The gas market is as vulnerable to the global situation as the oil market. This was shown, for example, by the increased demand for LNG in Asia, where the demand for LNG is high anyway (longer winter, cooler spring), as well as by the competitive prices, or even the incident with the blockage of the Suez Canal after the Ever Given container ship accident [19].

In the coming years, the situation on traditional raw material markets will be influenced by many factors, but in the long term, the energy transformation will be of key importance in terms of its pace and nature. When introducing a decarbonization policy, it can be expected that zero-emission fuels will eventually dominate the market. However, the development of renewable energy requires a stable energy system, which is provided by fossil fuels [6]. Therefore, in the coming years, gas and coal will continue to play a key role in economies [7].

2. The Mineral Resource Market in Poland

Poland is a country that is rich in mineral resources, which are more widely described in the paper [18]. There are four groups of mineral resources: energy resources, chemical raw materials, metallic raw materials, and rock raw materials. It should be mentioned that mineral resources constitute so-called non-renewable wealth, and it is, therefore, important to use them rationally. The biggest problem at present, when it comes to directing the country's raw material policy, decarbonizing, and replacing the existing energy sources with renewable sources (more wind, solar, and hydropower plants and an increase in biofuel production), concerns energy resources.

World Mining Data 2021 show that Poland ranks:

- Third in the world for rhenium production (5770 kg);
- Fourth place for lignite mining (52,855,000 t);
- Seventh place in silver mining (1,249,000 kg);
- Eighth in the production of coking coal (12,071,000 t);
- Tenth in terms of extraction of steam coal (50,009,000 t) and selenium (76 t).

Therefore, Poland has enormous deposits of all mineral resources [20]. Figure 1 shows the amount of resources in each of the four groups of mineral resources at the disposal of Poland, as well as what parts of these resources are managed by the country. In each group, one can see that there are definitely more resources, and the use is at the level of:

- Raw energy resources: 53% (2014), 52% (2017), and 34% (2020);
- Metalliferous minerals: 25% (2014), 27% (2017), and 24% (2020);
- Raw chemical resources: 22% (2014, 2017) and 24% (2020);
- Natural stones: 37% (2014), 36% (2017), and 33% (2020).

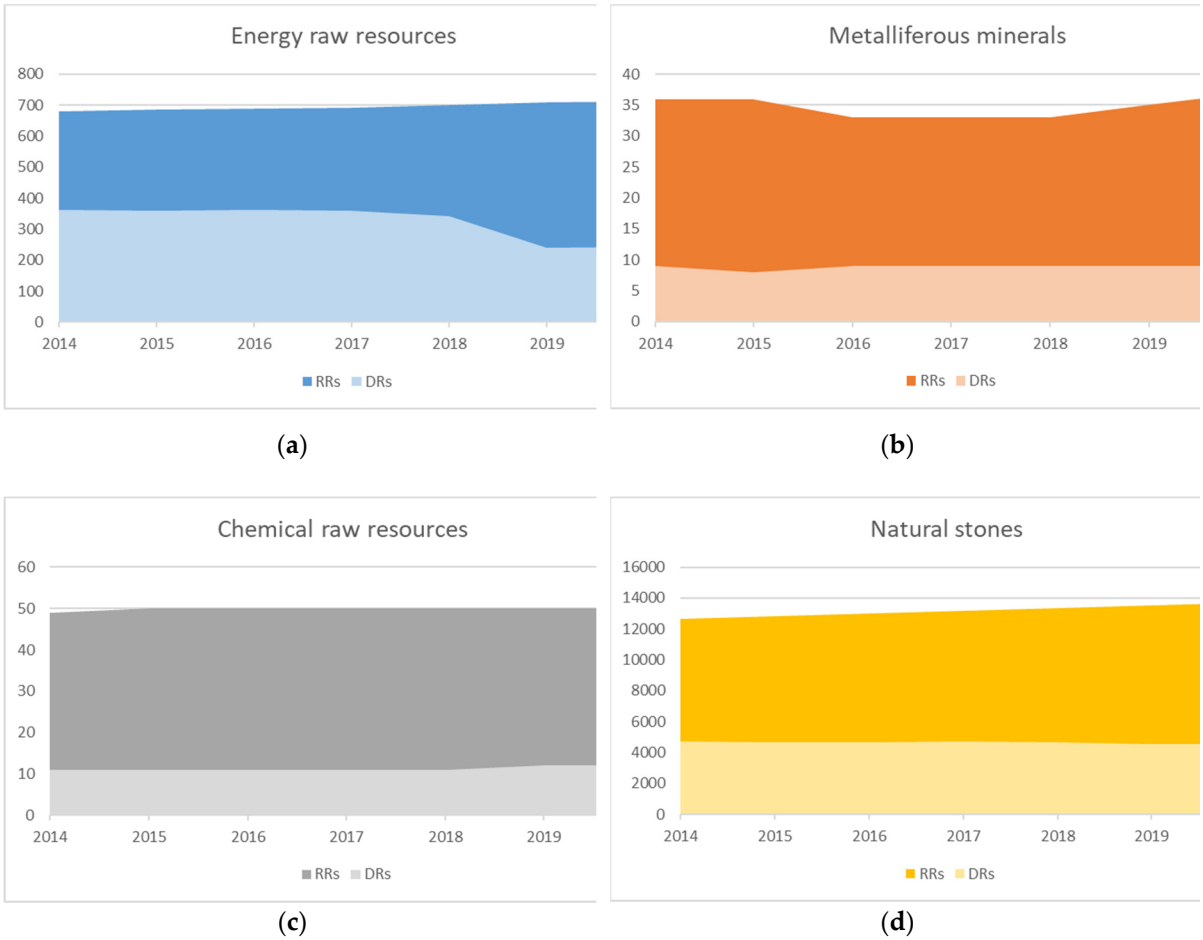

Figure 1. Comparison of the level of real resources (RRs) and deposit resources (DRs) for four groups of mineral resources in Poland (in millions of tons): (**a**) raw energy resources; (**b**) metalliferous minerals; (**c**) raw chemical resources; (**d**) natural stones.

It can be seen that, in the three groups presented in Figure 1b–d, the utilization of these raw materials was not very high and remained at a similar level in the analyzed period of 2014–2020. The situation was different in the case of energy resources, as shown in Figure 1a. In the initial years of the 2014–2017 analysis, the use of resources was above 50%. Since 2018 (49%), there has been a visible decrease in the managed resources, where, in 2020, it reached only 34%. This situation resulted from the adjustment of the activities of

raw material enterprises in the mining sector to the applicable regulatory provisions of the European Union and current market requirements. This example shows the implemented decarbonization scenario and the declining share of coal in the Polish energy mix [18].

In the case of energy resources, Poland has potential in terms of the amount of resources, which is twice as high; for other groups, it is even three or four times higher. As mentioned, the downward trend in the use of energy resources continued until 2020. However, in the current situation, with the war between Russia and Ukraine and Poland's plan to become independent from raw materials imported from Russia, including hard coal, it will certainly be possible to observe an upward trend in the use of energy resources.

The average volume of extraction of individual minerals in Poland for the period of 2014–2020 is shown in Figure 2. Most of the mined minerals are mined rock (65%), followed by energy (27%), metallic (7%), and chemical materials (1%). Over the years, minerals have been the most reliable sources of foreign currencies in the country.

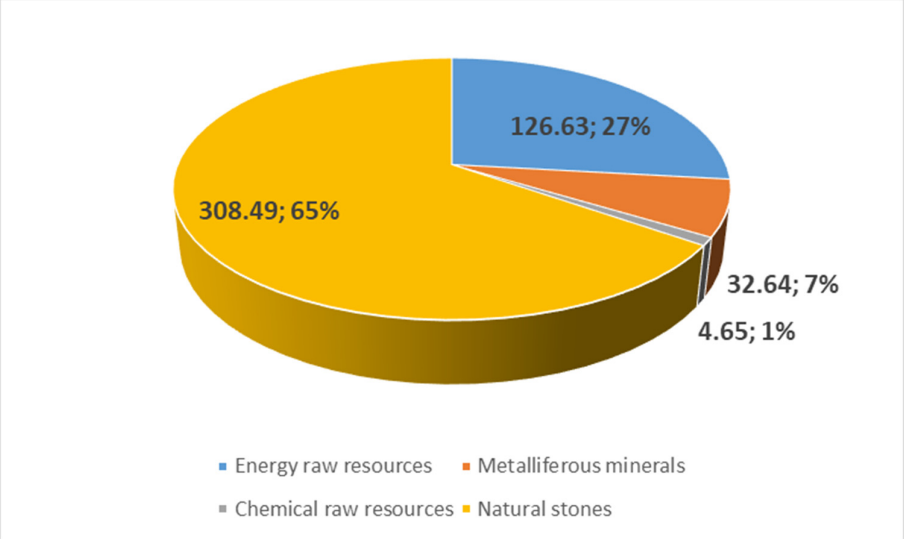

Figure 2. Average volume of extraction of energy minerals in Poland for the period 2014–2020. Authors' own study based on [21–27].

The level of extraction of rock minerals in the last two years has decreased compared to that in 2018; however, when analyzing the years 2014–2020, the trend grew, and the level of rock minerals definitely increased compared to the first period of the analysis. On the other hand, the level of energy minerals slightly decreased. The declining trend in the extraction of energy minerals was mainly due to the volume of their extraction in 2020. This situation resulted from the implementation of the EU Climate and Energy Goals, the aim of which is to achieve climate neutrality in the European Union (EU) by 2050, as well as from the adjustment of the activities of raw material companies in the mining sector to the applicable regulatory provisions of the European Union and current market requirements [3,8,9,18,28–33]. The levels of the other two groups of raw materials in Poland did not change much. The annual development of the extraction of individual groups of minerals in the analyzed years is shown in Figure 3.

The implemented decarbonization scenario and the draft of the social contract resulting from the strategy contained in "Poland's Energy Policy until 2040" put Poland's energy policy at a crossroads. Coal mining is particularly endangered. It was assumed that the share of coal in the Polish energy mix (by 2030) is to drop by more than half, i.e., to 37%, and to the level of 11% in the next decade [18,34].

The last two years have also brought changes in the raw material market in Poland. The coronavirus has significantly shaken the prices of raw materials, which fell in the strongest period of the pandemic (the lowest quotations in 2020 were in the range of USD 55–60 per ton), and at the moment, the price of this commodity has jumped up significantly and is

around USD 120 per ton, i.e., the price of coal increased by approximately 100% (prices were this high in 2012).Comparing the rates from last year with those of the current one, the gas price increased from the level of approximately PLN 65/MWh to PLN 116/MWh, i.e., by approximately 79% [35].

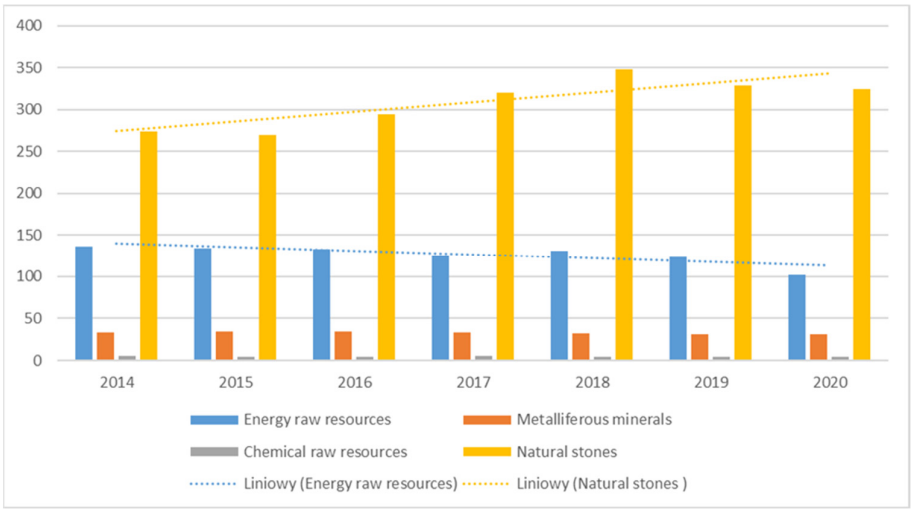

Figure 3. Formation of extraction of individual groups of minerals in Poland for the period of 2014–2020. Authors' own study based on [21–27].

The current market situation after the pandemic and the revival of the mineral resource markets have certainly created great development opportunities for new companies starting and wanting to start their operations in the raw material industry. This is also indicated by the research conducted by J. Korinek, who, in her work, provided a significant argument for the development of one's own services in this field, especially technical services [16]. They provide a specific economic expression. According to the author's calculations, the application of each additional patent related to mining brings a 0.1 percent increase in the added value of mining. On the other hand, an increase of 10 percent in the added value of mining, i.e., the use of 100 new solutions of this type, brings an average increase of 2.8 to 3.4 percent in national added value.

The analysis of the available literature shows that Poland has enormous mineral resources, but their use is not very extensive. The comparative analysis of the innovative activity of industrial enterprises that were innovatively active in Poland and Slovakia carried out in [20] showed that these countries face many challenges in order to maintain their positions in the rankings of innovativeness of the EU Member States. It should be remembered that innovations in the raw material sector are possible thanks to cooperation with other entities in the field of research and development [7].

3. Current Trends Affecting the Mineral Raw Material Market

The growing impact of sustainable development on the global economy also affects the economy of the Polish raw material industry. The European Green Deal [36] introduced by the European Commission is currently a kind of European road map presenting directions and guidelines for European countries to become climate neutral by 2050. The European Green Deal assumes, among other things:

- Providing clean, affordable, and safe energy;
- Mobilizing industry for a transparent and circular economy;
- Striving for a zero-toxin environment.

The assumptions of the European Green Deal include the actions of each country towards common EU assumptions. Faced with the finding that "Europe needs a new growth strategy to transform the Union into a modern, resource-efficient and competitive economy", the basic assumptions are presented in Figure 4.

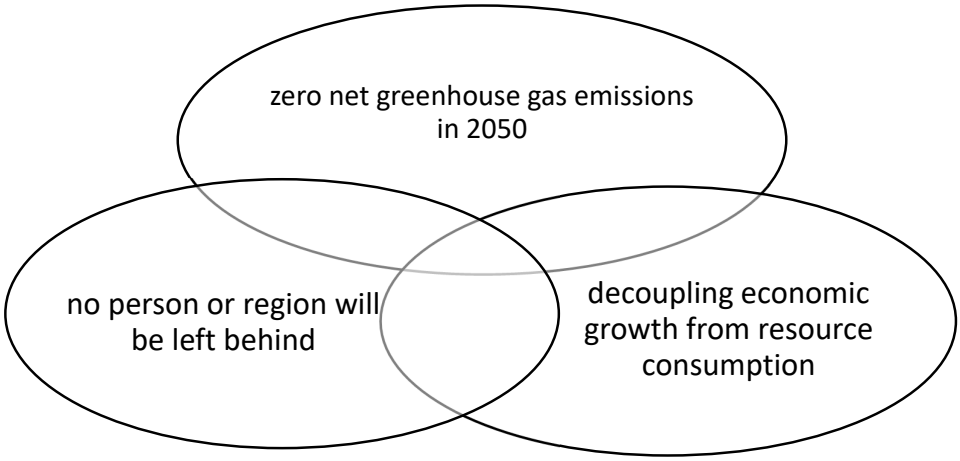

Figure 4. Assumptions of the European Green Deal. Source: [36].

One of the areas where the provisions of the European Green Deal will be of particular importance is the activity related to the delivery of clean, affordable, and safe energy. The general assumptions in this area are defined by the following provisions [33]:

- Further decarbonizing the energy system is key to meeting the 2030 and 2050 climate goals.
- Member States will submit their revised energy and climate plans by the end of 2019, and the Commission will assess the level of ambition of these plans and the need for additional measures should the targets be insufficient.
- The clean energy transition should engage and benefit consumers. Renewable energy sources will play a key role. Intelligent integration of renewable energy sources, energy efficiency, and other sustainable solutions in all sectors will reduce carbon emissions at the lowest possible cost.
- Measures should be put in place to protect against energy poverty of households that cannot afford the necessary energy services to ensure a basic standard of living.
- Achieving climate neutrality also requires intelligent infrastructure. Increasing cross-border and regional cooperation will help reap the benefits of an affordable clean energy transition.

The assumptions described above require a number of organizational, management, and conceptual changes to be made by Polish entities in the mining industry. This is particularly visible in entities directly related to the mining process, especially that of hard coal or lignite. Therefore, the proper implementation of these changes becomes of key importance not only for legal reasons, but also for economic and organizational reasons for entities operating both in the mining industry and in the mining sector. In light of business, there is, therefore, a market opportunity to take advantage of the opportunity for new entities to appear and develop on the market or to adapt the existing ones.

This opportunity certainly exists for business ideas related to any of the above-mentioned assumptions. This does not mean, however, that other ideas will not find a place in the raw material industry.

The entire industry, including companies operating within it, will have to follow the arrangements and guidelines of the Green Deal. It changes and strongly conditions the running of a business, but it does not change the fact that such activity is needed. Mineral resources are and will be indispensable elements of the Polish and global economy. Therefore, it is important that, in the RM industry space, economic entities operate and develop in accordance with technological progress and legal guidelines. There is also a need for new entities that will support the raw material sector with their activities.

Given the economy and the desire to generate profit, the owners and potential founders of such entities should target specific industries. This publication shows the results of research carried out precisely in order to identify such a free space for new entities in the mineral resource market.

4. Research Methodology

In order to identify the most popular areas of activity in the RM sphere, research was carried out in two main stages. The first was to identify areas of activity for new entities in the field of mineral resources by selecting projects in which Polish universities and institutes actively participated from several databases, and by analyzing the frequency of the occurrence of keywords. The second stage included a PESTEL analysis, which was carried out in order to identify important factors for new entities willing to start their operations on the market in the raw material industry.

First, an analysis of innovative projects that were implemented by research units from Poland (independently or in partnership) in 2010–2019 was carried out. Sources from which the information was obtained were the following databases: Cordis, Horizion, NCN, and NCBiR [37–40]. From all of the projects included in the databases mentioned above, 108 scientific, research, and development projects that were implemented in the field of mineral resources and in which Polish research centers actively participated were selected. Then, for each of the distinguished projects, keywords characterizing the scope and subject of a given project were defined.

In the next step, the specified keywords were grouped into homogeneous and thematically coherent groups and analyzed for popularity and frequency with the use of a tool on www.kwfinder.com (accessed on 12 February 2020). The initial analysis was based on two hundred keywords; for each of them, the frequency of occurrence in Internet search results was estimated. Then, it was possible to aggregate the keywords that were synonyms or very synonymous terms.

Subsequently, results with low search levels were eliminated. Ultimately, those whose frequency was greater than 500,000 occurrences were accepted for further research. Keywords with such a high frequency were decoded—individual keywords were classified according to their type and the type of economic activity that could be carried out in Poland in the area of mineral resources.

Additionally, a PESTEL analysis was performed for the identified market space for new entrants into the raw material industry. This was the second stage of the research. Thirty-one factors in six groups were included in the analysis:

- Political factors (4 factors);
- Economic factors (7 factors);
- Social factors (5 factors);
- Technological factors (9 factors);
- Environmental factors (2 factors);
- Legislative factors (4 factors).

Industry experts were asked to assess the importance and significance of a given factor in terms of a new entity in the analyzed industry in the area of IT operations. The respondents had a five-point scale at their disposal, where 1 meant that a given factor was not significant, and 5 meant that it was very important. In the analysis and selection of the dominant factors in the obtained results, the average of the ratings given by the respondents (1) and the weighted average (2) were used, where the weight was assigned to the rating.

$$\overline{x} = \frac{\sum_{i=1}^{n} x_i}{n}, \quad (1)$$

where:

$\overline{x}$—arithmetic mean of the grades given by the respondents for a given factor;
x_i—I-th rating assigned to a given factor;
n—number of respondents.

$$\overline{x}_w = \frac{\sum_{i=1}^{n} (x_i * w_i)}{\sum_{i=1}^{m} w_i}, \quad (2)$$

where:

$\overline{x}_w$—the value of the weighted average of the ratings given by the respondents for a given factor;

x_i—the value of individual ratings;

w_i—a weight that is a specific rating given to a given factor by the respondents;

n—the number of all ratings for a given factor;

m—number of all weights.

5. Identification of Free Market Space for New Entrants on the Market in the Raw Material Industry

In order to identify free market space for new entrants on the market, the most attractive spaces for the public in the area of mineral resources were designated. Figure 5 shows the attractiveness by industry according to the NACE classification [41].

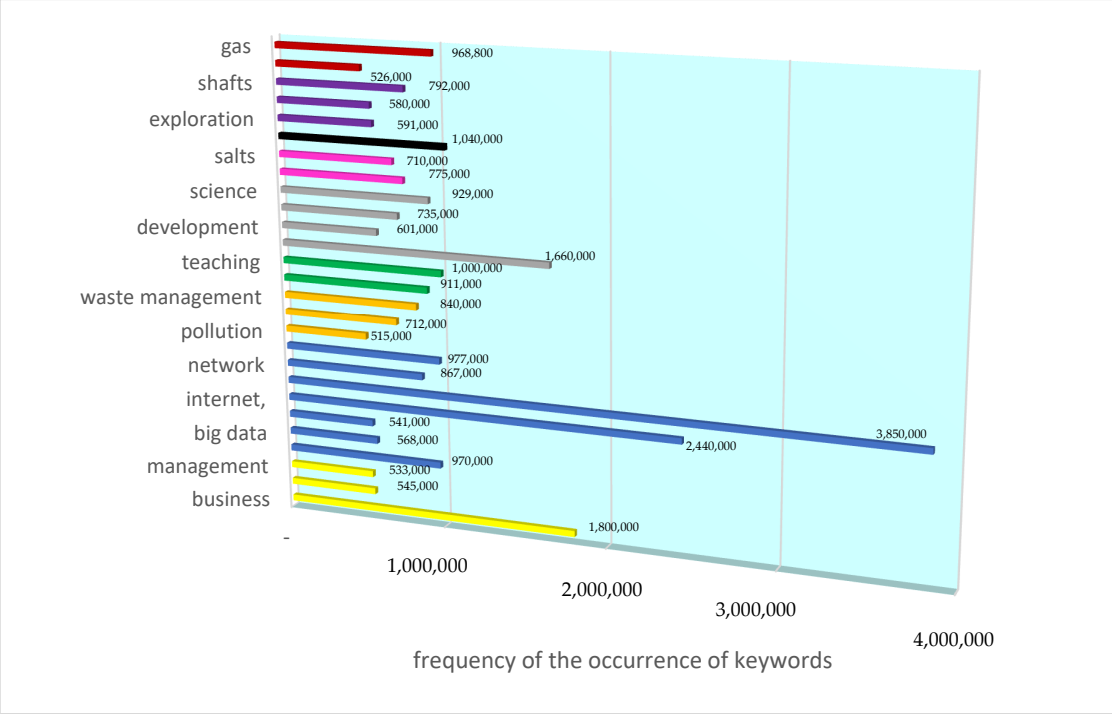

Figure 5. Assessment of the market attractiveness of industries related to the raw material industry. Source: authors' own study based on [18].

Table 1 explains the meaning of the colors used to indicate the relevant types of economic activity as used in the NACE.

Table 1. Explanation of the colors used in the conducted analysis.

Color	Type of Economic Activity
Yellow	Activities of head offices; management consultancy
Navy	Activities related to computer programming, consultancy, and related activities
Orange	Remediation activities and other waste management service activities
Green	Education
Gray	Other professional, scientific, and technical activities
Pink	Other mining and extraction
Black	Manufacture of computers, electronics, and optical products
Purple	Extraction of hard coal and lignite
Red	Production and supply of electricity, gas, steam, hot water, and air for air conditioning systems

The analysis shows that the largest market gap, which is in the area of public interest, occurs in the NACE classification of activities of new economic activities in the field of mineral resources and activities related to software, IT consultancy, and related activities, such as IT, Internet, and business.

Developing the results towards identifying a space for new entities, it is clear that the dedicated industry is an area closely related to Industry 4.0, which is strongly entering the Polish market, as well as to broadly understood ICT technologies.

However, in order for new entities to function in this area, a PESTEL analysis was also carried out, the results of which may be useful for these entities when shaping their business goals or creating business plans.

6. PESTEL Analysis for the Gap Identified in the Mineral Resource Market

The PESTEL analysis that was conducted in terms of the assessment of the impact of individual factors on the activities of IT entities in the raw material sector in Poland was based on expert research. Ten specialists who are well versed in the RM area made independent and anonymous assessments of individual factors, which are grouped into six groups and presented in Figure 6.

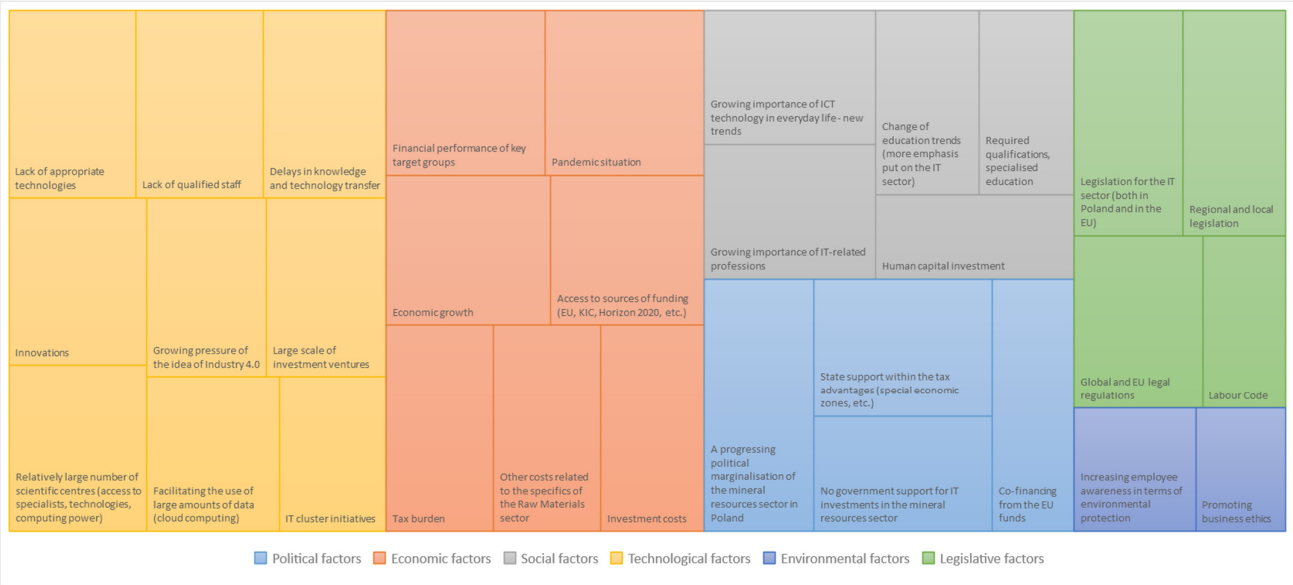

Figure 6. Six groups of PESTEL analysis factors. Authors' own study.

Two methods were used in the statistical dominance analysis: the arithmetic mean method and the weighted mean method. The results obtained from each method are summarized in Table 2. It was surprising that the respondents did not give any of the factors the highest score, i.e., 5. Most of the answers were between 2 and 4, although, in the whole group of analyzed factors, some factors were given the lowest ratings.

The methods of determining the statistical dominance of the factors gave similar results, although for some groups of factors, the results were divergent. Table 3 shows the significance rankings of the analyzed factors that were obtained as a result of the two methods. It shows that, out of the 31 factors, 14 factors obtained the same places in the rankings (corresponding places are marked in red in Table 3). The highest compliance was obtained for the factors that were important (occupying the initial rankings) and the least important (those that occupy the final rankings).

Table 2. The results of the analysis of the statistical dominance of factors in six groups.

Factor Type	Factor	Method I	Method II
Political factors	State support within the tax advantages (special economic zones, etc.)	3.1	0.647
	No government support for IT investments in the mineral resource sector	2.6	0.533
	Co-financing from EU funds	2.6	0.480
	A progressing political marginalization of the mineral resource sector in Poland	3.5	0.873
Economic factors	Economic growth	3.1	0.687
	Financial performance of key target groups	3.3	0.767
	Pandemic situation	3.3	0.767
	Access to sources of funding (EU, KIC, Horizon 2020, etc.)	2.9	0.607
	Investment costs	2.7	0.540
	Tax burden	2.8	0.587
	Other costs related to the specifics of the raw material sector	2.8	0.573
Social factors	Change in education trends (more emphasis put on the IT sector)	2.4	0.413
	Required qualifications, specialized education	2.2	0.347
	Growing importance of ICT in everyday life—new trends	2.9	0.580
	Growing importance of IT-related professions	2.9	0.607
	Human capital investment	2.1	0.367
Technological factors	Facilitating the use of large amounts of data (cloud computing)	2.6	0.520
	Delays in knowledge and technology transfer	2.9	0.593
	Innovations	2.9	0.593
	Lack of appropriate technologies	3.0	0.640
	Lack of qualified staff	3.0	0.680
	IT cluster initiatives	2.1	0.327
	Growing pressure of the idea of Industry 4.0	2.7	0.513
	Relatively large number of scientific centers (access to specialists, technologies, computing power)	2.9	0.567
	Large scale of investment ventures	2.7	0.500
Environmental factors	Increasing employee awareness in terms of environmental protection	1.9	0.287
	Promoting business ethics	1.4	0.147
Legislative factors	Global and EU legal regulations	2.8	0.547
	Regional and local legislation	2.9	0.593
	Labor Code	1.8	0.227
	Legislation for the IT sector (both in Poland and in the EU)	3.1	0.660

After ranking the results in each method from the highest to the lowest, it turned out that, out of the ten highest-rated responses, six of them were unanimous (they occupied the same places in both method I and method II). Among them were, by priority, i.e., the order of the place taken:

1. Political factors—a progressing political marginalization of the mineral resource sector in Poland (average: 3.5 and weighted average: 0.833);
2. Economic factors—financial performance of key target groups (average: 3.3 and weighted average: 0.767);
3. Economic factors—pandemic situation (same as the two above);
4. . . . .
5. Economic factors—economic growth (average: 3.1 and weighted average: 0. 673);
6. Legislative factors—legislation for the IT sector (average: 3.1 and weighted average: 0.660);
7. . . .
8. . . .
9. Economic factors—access to sources of funding (average: 2.9 and weighted average: 0.607).

Table 3. Ranking of the significance of factors in six groups according to the two methods.

Factor Type	Factor	Method I	Method II
Political factors	State support within the tax advantages (special economic zones, etc.)	4	7
	No government support for IT investments in the mineral resource sector	22	20
	Co-financing from EU funds	23	24
	A progressing political marginalization of the mineral resource sector in Poland	1	1
Economic factors	Economic growth	5	5
	Financial performance of key target groups	2	2
	Pandemic situation	3	3
	Access to sources of funding (EU, KIC, Horizon 2020, etc.)	9	9
	Investment costs	19	19
	Tax burden	16	13
	Other costs related to the specifics of the raw material sector	17	16
Social factors	Change in education trends (more emphasis put on the IT sector)	25	25
	Required qualifications, specialized education	26	27
	Growing importance of ICT technology in everyday life—new trends	10	14
	Growing importance of IT-related professions	11	10
	Human capital investment	27	26
Technological factors	Facilitating the use of large amounts of data (cloud computing)	24	21
	Delays in knowledge and technology transfer	12	11
	Innovations	13	12
	Lack of appropriate technologies	7	8
	Lack of qualified staff	8	4
	IT cluster initiatives	28	28
	Growing pressure of the idea of Industry 4.0	20	22
	Relatively large number of scientific centers (access to specialists, technologies, computing power)	14	17
	Large scale of investment ventures	21	23
Environmental factors	Increasing employee awareness in terms of environmental protection	29	29
	Promoting business ethics	31	31
Legislative factors	Global and EU legal regulations	18	18
	Regional and local legislation	15	15
	Labor Code	30	30
	Legislation for the IT sector (both in Poland and in the EU)	6	6

7. The Results of Analyses from Individual Groups of Factors

Taking into account the statistical dominance of the factors, in the group of political factors was found the most important factor of the entire group of 31 factors under study; this was specifically pointed out by the experts, who awarded it with the most points. This was the progressive political marginalization of the mineral resource sector in Poland, which took first place in both methods (Figure 7). This is undoubtedly an important factor that constitutes a political barrier to the operations of IT entities in the raw material sector in Poland. The most visible in this respect is the lack of government support for IT investments. The only forms of public aid are preferential conditions for enterprises operating in special economic zones (SEZs) in the form of tax exemptions. The only possibility to obtain funds for operations is to apply for EU funding.

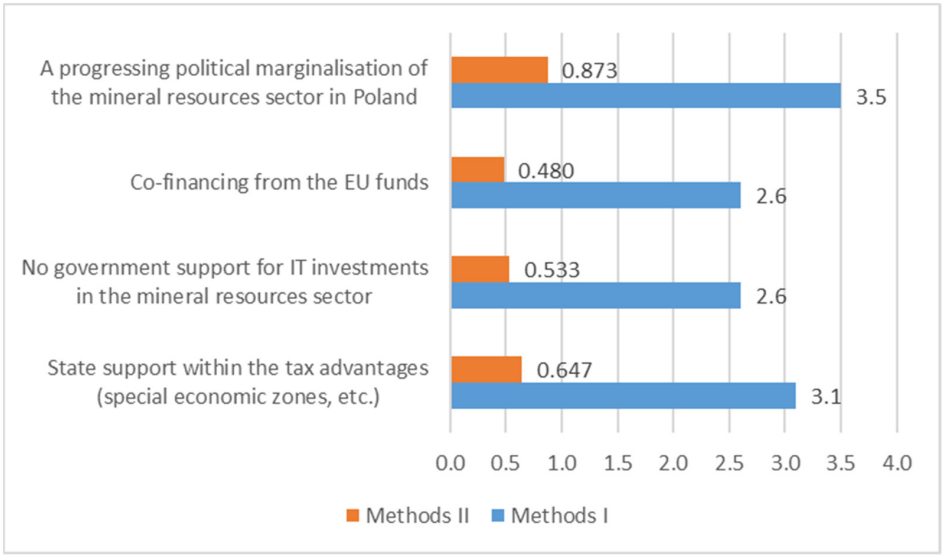

Figure 7. Summary of the results for the political factors from both methods. Authors' own study.

The second of the specified groups was the group of economic factors (Figure 8). This group had the greatest number of factors that were ranked in the rankings of importance. It is equally important that the majority occupied the first places in the rankings of statistical dominance right after the progressive political marginalization of the mineral resource sector in Poland (one of the political factors that took the first place), which clearly indicates the importance of this group of factors. The least significant barriers were identified by the respondents as: investment costs, tax burdens, and other costs related to the specific nature of the raw material industry. On the other hand, they considered two barriers out of seven as the most important. They were: the pandemic and the financial results of the main groups of recipients. The pandemic definitely worsened the situation of many enterprises, including enterprises in the raw material industry. The possibility of applying for additional EU funds for activities (EU, KIC, or Horizon 2020 projects) is extremely important, as it largely determines the activities of IT entities in the raw material industry in Poland.

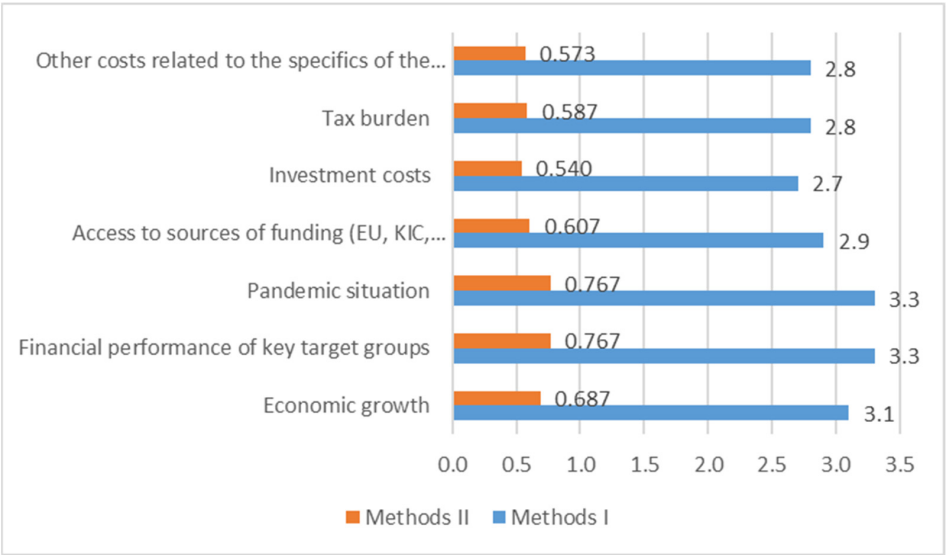

Figure 8. Summary of the results for economic factors with both methods. Authors' own study.

The third group of factors (social factors) in terms of statistical dominance was definitively further ranked. This may be due to the fact that these factors change over time,

such as with the importance of professions that entail the necessary qualifications needed to perform a specific profession (necessary specialist or industrial education) or changes or modifications in education at universities. The latter are subject to existing trends or forecasts in the market in terms of the development of the necessary competences and skills. In the survey, the respondents pointed to the recently increasing importance of IT-related professions (caused by staff shortages), as well as new trends resulting from the growing importance of ICT in everyday life (Figure 9). These factors were considered by the respondents to be the most important for the operations of IT industry entities in raw materials.

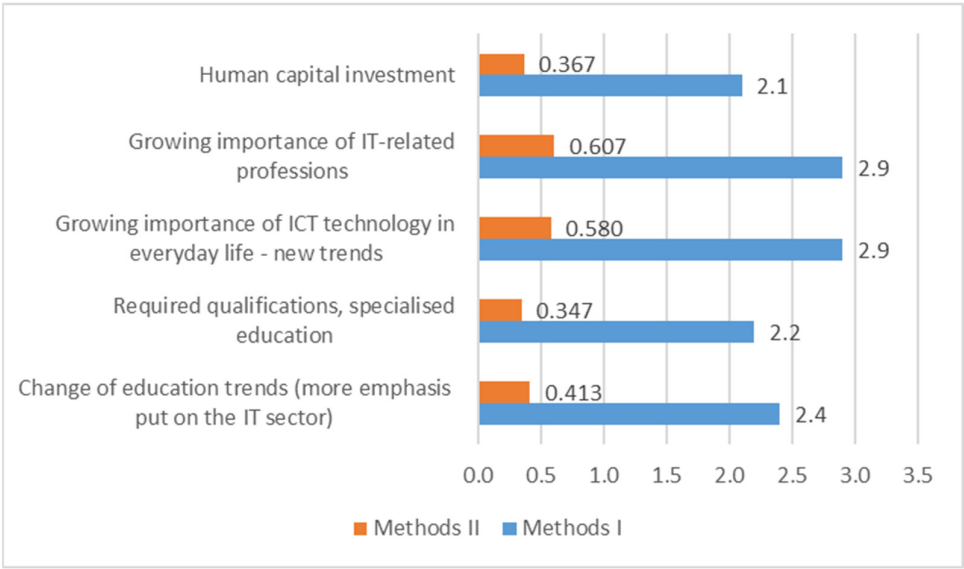

Figure 9. Summary of the results for social factors with both methods. Authors' own study.

Technological factors constituted the most extensive group of factors and were found in virtually every part of the ranking list. The factors constituting the greatest technological barriers included by the respondents were the lack of qualified staff and the lack of equipment with appropriate technology, which was the weakest factor in the IT cluster initiative. The factors that were indicated as the most important may constitute a fairly strong limitation in the functioning of companies in the IT industry. They were followed by a relatively large number of research centers, innovations, and delays in the transfer of knowledge and technology. The latter can result from, among other things, a lack of developed strategies or policies, incorrect allocation of EU funds (they support the SME sector, not strategic industries), and over-bureaucratization of support mechanisms (spending funds in accordance with procedures), not to mention the lack of an appropriate level of competence in public administration employees, which results in lack of help on their part and the fact that administrative issues take a lot of time at the expense of substantive activities. On the other hand, innovative undertakings largely affect the competitive positions of enterprises on the market [42]. The raw material industry in Poland is characterized by a low level of innovation; therefore, cooperation with various entities, including research centers, becomes essential for mining enterprises [7,20]. Good institutions enable the economy to achieve the optimal allocation of resources [43]. The activity of these centers and universities in the field of transfer and commercialization of knowledge and technology is not only of strategic importance, but also contributes to the stimulation of economic growth [44]. It should be mentioned that the above factors, to which the respondents paid special attention, are related to the idea of Industry 4.0, which is a significant barrier to the functioning of the industry. The results for the technological factors are shown in Figure 10.

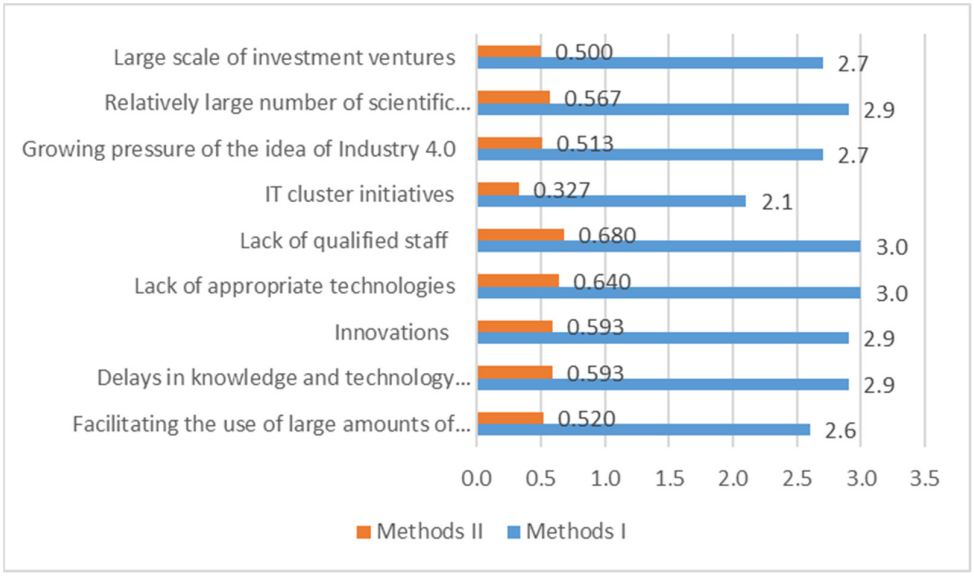

Figure 10. Comparison of the results for technological factors with both methods. Authors' own study.

Environmental factors closed the rankings of the dominant factors. The decrease in their weight was also visible in the ratings assigned to them by the respondents. In line with the current trends in environmental awareness, the greatest importance was attached to an increase in employees' awareness of environmental protection (Figure 11), although the ratings awarded to this factor were surprisingly low. The second factor, the promotion of business ethics, was described by the respondents as a factor influencing the functioning of companies in the IT industry to a lesser degree.

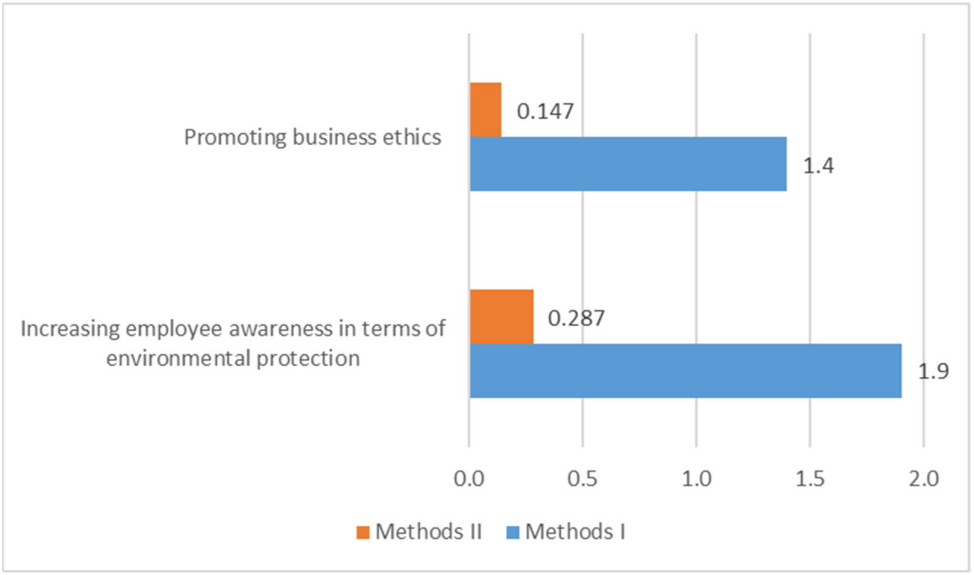

Figure 11. Summary of the results for environmental factors with both methods. Authors' own study.

The last group was that of legislative factors, most of which were assessed by experts as less important (lower places on the statistical dominance list), except for one—legislation and legislation for the IT sector (ranked sixth). The regulations of the Labor Code were considered the least significant barrier (Figure 12). Enterprises operating in the IT industry must conduct their activities in accordance with the laws and regulations for the IT sector, including regional and local legal regulations, as well as global and EU legal

regulations. However, on a general scale, these factors were assigned lower scores than those of economic ones, but they were comparable to the political or technological ones.

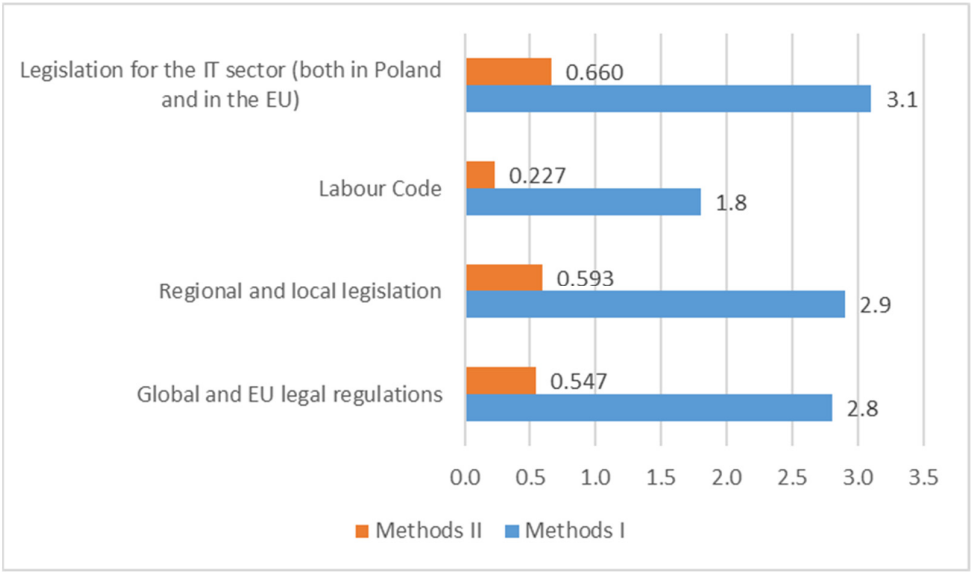

Figure 12. Summary of the results for legislative factors with both methods. Authors' own study.

8. Summary and Final Conclusions

The diagnosis of the business area in the mineral resource market in Poland seems to be a much-needed task for many reasons. The basic principle of determining a business gap is related to identifying potential investors in each type of market with the places and scope of specific activities where these businesses can develop effectively. The second element that indicates the need for such action is that of the ongoing changes in the raw material industry in Poland. The raw material market is currently undergoing a constant transformation in terms of technology, in addition to organizational and legal changes. The first one results from technological progress and the increasingly confident Industry 4.0 solutions. The second is a mix of guidelines from the European Union and the world (which translates into Polish legislation) and the changing global trends in the organization of production processes and the organizational cultures of entities (for example, due to the Green Deal or the circular economy) [45].

It is clearly visible that the mineral resource sector in Poland is an area where many changes will take place in the coming years. The conducted research and results make it possible to indicate, first of all, the areas in which new entities on the market may operate. Secondly, the PESTEL analysis shows which threats may occur in this area.

The research conducted here may be useful to potential entities in the process of planning their business activities, as well as in the course of carrying out their activities. The PESTEL analysis indicates the factors that will determine operations on the raw material market in Poland. In terms of individual areas of the environment, new entities should pay special attention to securing the following determinants: the progressing political marginalization of the mineral resource sector in Poland, financial performance of key target groups, the pandemic situation, economic growth, legislation for the IT sector, and access to sources of funding. This is particularly important in the case of university graduates and young people who are just starting their businesses in the industry. Their fresh ideas and open minds, combined with these strong determinants, can be a barrier to business development. Entrepreneurship should be supported and developed because it contributes to the development of the world.

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