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A Silesian perspective on small and medium-sized enterprises facing the challenges of the green economy

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ABSTRACT

Objective: This article aims to identify and analyse the opinions of small and medium-sized enterprises (SME) entrepreneurs operating in the Silesian Voivodeship on the prospects of their companies in relation to the need to implement so-called green solutions. The key aim of the study was to identify differences in assessments of future developments in the labour market of the Silesian Voivodeship between two groups of respondents: SME companies with the potential to create green jobs and SMEs in the green sector.

Research Design & Methods: We based the analysis on empirical data collected during fieldwork, based on a dedicated interview questionnaire. We used stratified-quota sampling. We conducted the entire study in the form of computer-assisted telephone interviews (CATI) with a sample of 635 respondents. Key relationships between nominal variables and their categories were tested using a chi-square test to determine the significance of these relationships. For factors significantly influencing interest in companies' environmental activities, correspondence analysis was additionally applied.

Findings: Most respondents believe employment in SMEs with green job potential will remain stable until 2027. Micro-entrepreneurs tend to foresee unchanged employment, while medium-sized companies plan to increase staff. The study highlights that green jobs are not clearly defined, focusing more on retraining employees to meet new environmental requirements than creating new roles related to green technologies. Entrepreneurs believe that Silesia's socio-economic infrastructure supports green economy initiatives, while companies already engaged in the green sector effectively create green jobs. Notably, 71.4% of these companies' representatives expect strong growth in the sustainable economy by 2027.

Implications & Recommendations: The green economy in Silesia has promising prospects but faces challenges. Supporting access to public funding and offering preferential pricing for eco-friendly technologies could boost interest across businesses. Raising public awareness and environmental education is crucial to prepare workers and the public for upcoming economic shifts. Simplifying subsidy procedures for pro-environmental actions and adjusting legal regulations could accelerate the adoption of green solutions, making them more attractive to regional enterprises.

Contribution & Value Added: This research enriches prior studies on sustainability and entrepreneurship by addressing the perspectives of SMEs in Poland. The analysis highlights how SME entrepreneurs in Silesia view the green economy. Most companies with green job potential (66.2%) found the region's socio-economic infrastructure favourable for green economy adoption. Promising areas included renewable energy, clean technologies, and waste management, with photovoltaics and recycling identified as key. Among established green-sector firms, 71.4% expect strong sector growth by 2027, aligning with the sustainable development goals (SDG).

Article type: research article

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INTRODUCTION

Scientific studies confirm the importance of the economic condition of SMEs for the proper functioning of the economy. In the economic structure of both the European Union (EU) and Poland, SMEs are numerically dominant entities, employing more than two-thirds of the workforce (Table 1).

Table 1. Type of enterprises and their number, structure and employees in 2023

Criterion	Type of company	EU		Poland		Silesian Voivodship	
		lb.	%	lb.	%	lb.	%
Number and structure of enterprises by type	Micro	21 851.492	93.5	1 963.893	95.0	515 471	96.2
	Small	1 287.959	5.5	84 353	4.1	16 414	3.1
	Medium	201 000	0.9	14 712	0.7	3 323	0.6
	Large	42 000	0.2	3 251	0.2	531	0.1
	Total	**23 382.451**	**100**	**2 066.209**	**100**	**535 739**	**100**
Number and structure of employees in enterprises by type	Micro	37 204.470	29.2	3 477.828	34.8	421 360	24.9
	Small	24 743.146	19.4	1 664.747	16.7	297 124	17.5
	Medium	20 088.003	15.7	1 519.964	15.2	342 318	20.2
	Large	45 584.293	35.7	3 334.374	33.3	634 738	37.4
	Total	**127 619.912**	**100**	**9 996.913**	**100**	**1 695.540**	**100**

Source: GUS, (2024). Local Data Bank, https://bdl.stat.gov.pl

The number of SMEs has been growing steadily in recent years in both Poland and the European Union. Enterprises – operating in Poland – generate almost three-quarters of Poland's Gross Domestic Product (GDP). An analysis of the share of enterprises in the creation of GDP by sector of the economy shows significant differences between large enterprises and SMEs. In the latter's case, the services sector is the most important, with a share of 44.5% in GDP creation, compared to 31.1% for large companies. The second most important is trade (26.1% – SME; 11.2% – large companies). On the other hand, in large companies, industry (55.3% – large companies; 17.4% – SME) has a visibly higher contribution to GDP creation than the SME sector, while construction (2.4% – large companies; 12.0% – SME) is the least important (Zakrzewski *et al.*, 2023).

The particular importance of the SME is evident in the Silesian Voivodeship. In 2023, employment in this sector accounted for 62.4% of the region's total workforce. In comparison, in 1989, large heavy industry was significantly predominant. The Silesian Voivodeship generated 25% of the national income and was home to 65 coal mines, 13 power plants, 19 ironworks, 255 construction companies, 82 agricultural enterprises and almost 35 000 small craft businesses. The excessive industrialisation of the region contributed to high levels of harmful emissions, which led to an ecological emergency at the time and continues to cause numerous problems today (Fic & Krzyżanowski, 2024).

The political and economic transformation initiated in Poland in 1989 changed the economic situation of the Silesian Voivodeship. The long-standing domination of hard coal mining, metallurgy, and energy based on traditional energy generation sources led to the region's economic collapse and mass unemployment. The signing of the Europe Agreement on 16 December 1991 set the framework for Poland's institutional and legal relations with the European Union. It triggered a slow change in the structure of the labour market. This forced entrepreneurs to look for new markets and the employed and jobseekers to acquire new qualifications and competencies. Pre-accession and aid funds supported the initiated transformation process.

Poland's accession to the EU in 2004 opened up the possibility of benefiting from a wide range of financial aid, contributing to the country's dynamic socio-economic development. The success of the decisions taken to stimulate entrepreneurship with aid funds is particularly evident in the Silesian Voivodeship, which, from a region in economic decline, has become one of the regions with the highest potential and GDP dynamics in Poland.

Data for 2021 shows that industry in the region accounts for about 13% of the GDP and about 17% of national industrial production, of which 62% is in the private sector. The region produces most of Po-

land's hard coal (approx. 91%), rolled products (approx. 63%), coke (approx. 42%), crude steel (approx. 68%), electricity (approx. 19%) and passenger cars (approx. 82%). Coal mining, iron, zinc, and lead metallurgy, power generation, the electrical machinery, food and chemical industries and the automotive industry play a vital role in the region's development (Situation in the regional economy of the Silesian Voivodeship May 2021 – monitoring report, 2021). In 2022, the Silesian Voivodeship will generate 12.1% of Poland's GDP, ranking second in Poland after the Capital Region of Warsaw (cf. Table 2).

Table 2. Gross domestic product by region in 2022 (current prices)

Regions	Total			Per capita	
	PLN million	In percentage terms	Previous year=100	In PLN	Poland =100
Poland	3 06 495	100.0	116.6	81 093	100.0
Lower Silesia	263 119	8.6	118.2	90 980	112.2
Kujawsko-pomorskie	133 869	4.4	116.5	66 547	82.1
Lublin	112 047	3.7	114.9	55 182	68.0
Lubuskie	65 163	2.1	116.1	66 131	81.8
Lodz	181 851	5.9	113.9	76 228	94.0
Małopolskie	246 895	8.0	114.4	72 004	88.8
Mazovia regional	168 057	5.5	121.4	74 460	91.8
Opolskie	60 854	2.0	112.7	64 383	79.4
Podkarpackie	114 747	3.7	13.1	55 125	68.0
Podlaskie	68 542	2.2	117.4	59 818	73.8
Pomeranian	191 386	6.2	121.3	81 149	100.1
Silesia	371 166	12.1	118.0	85 131	105.0
Świętokrzyskie	66 800	2.2	110.6	56 507	69.7
Warmińsko-Mazurskie	77 218	2.5	114.0	56 368	69.5
Warsaw capital	536 261	17.5	117.8	164 776	203.2
Wielkopolskie	300 216	9.8	115.5	85 867	105.9
Zachodniopomorskie	109 303	3.6	113.2	66 443	81.9

Source: GUS, (2024), https://obserwatorgospodarczy.pl

This article aims to identify the opinions of SME entrepreneurs operating in the Silesian Voivodeship on the prospects for further functioning of their companies, given the need to implement so-called green solutions. The focus was on issues relating to the level of employment as a consequence of implementing so-called green solutions in business models and identifying the opinions of SME entrepreneurs on the opportunities of the green economy in the Silesian Voivodeship.

The novelty of the article lies in filling a research gap regarding the identification of SME entrepreneurs' views on the potential opportunities for implementing green solutions, particularly in the context of public labour market institutions' support for measures to increase the implementation of green solutions funded by the Just Transition Fund (JTF). The article deepens the understanding of the challenges and highlights the need to implement green practices in a region with a traditionally strong industrial focus.

It also highlights the role of the various incentives offered under the JTF to support entrepreneurs in implementing green change.

According to the authors, the study results are an essential addition to previous research on sustainability and entrepreneurship, which has mainly focused on the practices of large corporations, neglecting the perspective of smaller entities such as SMEs in Poland.

The article has a practical dimension. It focuses on analysing the opinions of SME entrepreneurs in the Silesian Voivodeship in the context of implementing green solutions. The main research questions concern the impact of employment level and the local level of green economy development on entrepreneurs' willingness to integrate sustainable practices into their business models.

The article will include the following sections: an introduction, which will explain the context of the changes in the economy and describe the characteristics of SMEs; a literature review, which will

discuss the transformation in the Silesian region and provide a description of the Just Transition Fund; materials and methods, which will explain the research methods used; main results, which will present the findings, discuss their practical implications, and provide recommendations; and conclusions, which will summarize the key points.

LITERATURE REVIEW

The first decade of the 21st century radically changed the outlook on the functioning of the global economy. The financial crisis that began in 2007 in the United States quickly spread to other countries, revealing serious weaknesses in previous economic doctrines. The crisis exposed the unreliability of the liberal economic principle, which assumed that a free, unregulated market, with minimal state interference, would ensure equilibrium and economic growth. These theories assumed that self-regulation would correct any errors in economic processes. However, reality proved otherwise, which led to these beliefs being challenged (Stiglitz, 2010).

The response to the global crisis has become a conviction of the need for international cooperation and the search for global solutions to growing economic problems. The crisis has highlighted that the effects of the existing economy include financial, social, ethical, and environmental problems. Environmental degradation, climate change and overconsumption of natural resources have become clear effects of the production and consumption model, especially in developed countries. Scholars have also identified raw materials and food waste as a consequence of an inappropriate economic model (Jackson, 2009; Roubini & Mihm, 2010; Kołodko, 2011; Goswami, 2018). The direct social cost of the crisis has been the loss of public trust in banks, financial institutions, corporations and public institutions and governments, which have so far tolerated irregularities and risks in the economic system. The crisis has made people and governments realise that a return to previous economic models is impossible and that new solutions must be sought (Antetomaso *et al.,* 2018).

A new economic model that began to gain prominence was sustainable development. Initially defined in the 1987 Brundtland Report as development that does not jeopardise the ability of future generations to meet their needs, sustainable development has evolved and found its place in documents such as Agenda 21, the outcome of the 1992 UN Conference in Rio de Janeiro (World Commission on Environment and Development, 1988; United Nations Conference on Environment and Development, 1992). The European Union's first pro-environmental development strategy, Europe 2020, prepared with the lessons learned from the global financial crisis, brought the idea of the green economy and green growth into the mainstream of EU policy (Dahl, 2021; Sikora, 2021; Eckert & Kovalevska, 2021). It also contributed to the establishment of financial instruments – for cohesion policy, environmental policy, including climate policy, agricultural policy, energy policy, transport policy, research and development policy, as well as humanitarian and development aid towards third countries – that will support decisions to change the business model towards a green economy (European Commission, 2010). Following reflections on the causes and consequences of the 2007 economic crisis, the trend of searching for a new economic model was gradually developed through global and regional arrangements (United Nations General Assembly, 2015; European Commission, 2019) aimed at strengthening reporting obligations and corporate sustainability responsibilities, examples of which include the Corporate Sustainability Reporting Directive (CSRD) (European Parliament and Council of the European Union, 2022) from 2022 and the Corporate Sustainability Due Diligence Directive (CSDD) from 2024 (European Parliament and Council of the European Union, 2024).

Businesses operating within EU member states must conduct their activities in accordance per the EU's legal requirements. One of the dominant changes taking place in the environment of businesses operating within the EU in recent years is the need to meet the Sustainable Development Goals and create a Circular Economy model.[1] Green transformation is therefore becoming the dominant logic

[1] A closed economy is a sustainable, low-carbon, resource-efficient and competitive economy. Products, materials and resources in a closed economy are used and maintained for as long as possible, keeping waste generation to a minimum.

shaping the socio-economic development of the economies of individual countries and is particularly changing the face of SMEs (Tomaszewski, 2020).

Today, management practices that value green transformation are most prevalent in large companies and corporations. Since 2004, they have been obliged to report their activities according to environmental, social and governance (ESG) standards. Ultimately, however, it is assumed that all entities operating within the EU will transform their activities to meet the Sustainable Development Goals. This implies the need to seek and implement various incentives for entrepreneurs to change their business models and introduce green solutions in their businesses. Since, as shown above, the importance of the SME for economic development is high, the European Union, to encourage entrepreneurs to create green jobs, announced and introduced the European Green Deal (European Commission, 2019), a package of policy initiatives aimed at putting the EU on the path of ecological transformation and ultimately achieving climate neutrality by 2050. The various instruments prepared under the European Green Deal support the transformation of the EU into a fair and prosperous society with a modern and competitive economy (Rauh, 2018). However, the success of the green transition will depend not only on the financial, legal and awareness instruments prepared by the EU and individual Member States, but mainly on the attitudes towards green change of entrepreneurs, especially those operating in the SME sector.

For SMEs, which are often less financially flexible, it is crucial to easily obtain financial support instruments that will enable them to transition to the green economy. Companies' financial health and attitudes towards sustainability will determine the effectiveness of implementing the new economic model (Słupik *et al.,* 2021). Adopting a green growth model is particularly important in regions undergoing profound economic change. An example of such a region in the European Union is the Silesian Voivodeship in Poland. For many years, the mining industry (hard coal) and the steel industry dominated this region. Today, the province is undergoing intensive transformation to adapt to modern and sustainable economic models.

The European Green Deal envisages climate neutrality and non-reliance on non-renewable natural resources in the economy. The premise of the European Green Deal is to achieve zero greenhouse gas emissions by 2050 and EU climate neutrality as a consequence of decarbonisation in a fair way (Engel *et al.*, 2020). The European Commission has proposed the creation of a Just Transition Mechanism, which would include a Just Transition Fund (JTF). This mechanism focuses on regions and sectors where transformation has the greatest impact due to their dependence on fossil fuels, including coal, peat and oil shale, and industrial processes with high GHG emissions. The Just Transition Fund is a financial instrument within the framework of the Cohesion Policy to provide support to areas facing significant socio-economic challenges resulting from the transition in the pursuit of climate neutrality. The fund's design facilitates the implementation of the European Green Deal, which aims to achieve EU climate neutrality by 2050 (European Union, 2016; European Parliament and Council of the European Union, 2021).

The JTF is a key tool to support the most transition-affected areas in achieving climate neutrality and preventing the widening of regional disparities. Its main objectives are to mitigate the impacts of the transition by funding the diversification and modernisation of the local economy and to mitigate the negative effects on employment. To achieve these objectives, the fund supports investments in areas such as digital connectivity, clean energy technologies, emission reductions, industrial site regeneration, worker retraining and technical assistance. The fund provides support to all EU Member States. The allocation criteria base on industrial emissions in carbon-intensive regions, industrial employment and coal and lignite extraction, peat and oil shale production, and the level of economic development.

The budget for the Just Transition Fund for 2021-2027 is EUR 17.5 billion, including EUR 3.85 billion for Poland. Member States can supplement their Just Transition Fund allocations with funds allocated under the European Regional Development Fund and the European Social Fund Plus. The funding goes to the regions most affected by social and economic transformation. In Poland, these include the Dolnośląskie, Śląskie, Małopolskie, Łódzkie, Wielkopolskie and Lubelskie regions. Most of this amount, more than EUR 2.22 billion, has been earmarked for the Silesian Voivodeship for measures related to achieving the objectives of enterprise restructuring, including SMEs, and social support for people who may lose their jobs due to economic change. This is more than 72% of the value of the entire fair

transformation programme for Silesia. The remaining 27% is spent on investments related to environmental protection (Board of the Silesian Voivodeship, 2021).

The JTF for the Silesian Voivodeship mainly covers areas affected by the restructuring of the coal sector, such as mines, power plants, metallurgy and related economic and social sectors. The Just Transition Found allocated to the Silesian Voivodeship has one main task – to mitigate the social, economic and environmental impacts resulting from the transition to a climate-neutral economy. The aim is to support investments that will contribute to the region's sustainable development, considering the needs of the local community, the protection of the environment and the development of innovative and ecological solutions. The Just Transition Plan for the Silesian Voivodeship covers seven sub-regions of the Silesian Voivodeship: Katowice, Bytom, Sosnowiec, Gliwice, Tychy, Rybnik, Bielsko (Board of the Silesian Voivodeship, 2022). JTF in the Silesian Voivodeship is an excellent opportunity for regional SMEs to obtain non-refundable grants for developing their business. Co-financing can aid development projects involving, among other things, the modernisation of existing technological facilities, production automation or improved energy efficiency. Investments carried out under the JTF can contribute to increasing the competitiveness of the local economy and, at the same time, improve the quality of life of the inhabitants of the Silesian Voivodeship, e.g. by generating new jobs for entrepreneurs.

An important factor determining the development of an enterprise is its ability to react to changes in its environment. The entrepreneur should observe the environment carefully and, when changes occur, take immediate action to adapt the enterprise to the environment.

RESEARCH METHODOLOGY

We based the analysis presented in the article on empirical data collected during a field study commissioned by the Voivodeship Labour Office in Katowice and entitled it 'Labour market in the area of green economy in the Silesian Voivodeship.' The BST Group conducted the research between 31 August and 20 December 2023 based on a dedicated interview questionnaire using stratified-quota sampling. The BST Group conducted the entire survey in the form of computer-assisted telephone interviews (CATI) with a sample of 635 respondents, resulting in a 95% confidence level and a maximum error of 4%. The survey aimed to estimate current and potential labour demand in the green economy, including the occupational structure of labour demand.

The study's key objective was to identify differences in assessments of future labour market developments in the Silesian Voivodeship between two groups of respondents: SMEs with the potential to create green jobs and SMEs in the green sector. The study used survey questionnaires containing, respectively, 20 closed questions for companies with the potential to create green jobs and 18 closed questions for companies in the green sector. The metrics section of the questionnaire included questions on company size (number of employees), type of business and location in the sub-regions of the Silesian Voivodeship. We used the data on the number of employees (i.e. the classification of companies into micro, small and medium-sized) for the subsequent correspondence analysis to check whether the opinions of companies with green potential differ from those operating in the green sector.

In the first group of respondents, representing SMEs with the potential to create green jobs, 334 computer-aided telephone interviews (CATI) were conducted. Companies were classified in this group if they indicated that they were undertaking environmental activities in at least two of the specified categories, such as waste segregation, use of low-emission vehicles, recycling, purchase of energy-efficient machinery, use of green materials, thermal insulation of buildings, optimisation of supply chains and other activities that improve the environment. In the second group of respondents, comprising green sector companies, 301 CATI telephone interviews were conducted. These companies had to prove that they were operating in areas related to the green economy, such as renewable energy sources, clean technologies, energy-efficient construction, public transport, waste management, ecotourism, and innovative environmental and natural resource management technologies.

The study used sophisticated analytical tools appropriate to the characteristics of the variables and the complexity of the issues analysed. We examined key correlations between nominal variables and their categories using the chi-square test (Cramér, 1946; Brzezińska, 2013), which made it possible to

determine the significance of these relationships. For factors significantly influencing interest in companies' environmental activities, correspondence analysis was additionally applied (Greenacre, 2021; Hjellbrekke, 2018; Stanimir, 2005).

RESULTS AND DISCUSSION

In line with the aim of the research, the first stage examined which characteristics of the SMEs surveyed influence their interest in implementing pro-environmental solutions. The results of the chi-square tests, presented in Table 3, indicate statistically significant relationships between interest in green measures and company characteristics. The chi-square test enables the examination of the association between two qualitative variables. The relationship is considered statistically significant if the calculated p-value is lower than the accepted significance level.

For companies in the green sector and companies with the potential to create green jobs, the key factor influencing interest in implementing pro-environmental solutions is the projected employment situation and opinions on the future of the green economy in Silesia. Forecasts for future employment and the development of the green economy in the region play an important role in the decisions of both groups of companies to engage in pro-environmental activities.

Table 3. Results of the chi-square tests carried out

Characteristics	In your opinion, are companies in the Silesian Voivodship interested in introducing environmentally friendly measures?			
	Green sector		Companies with green potential	
	chi-square	p-value	chi-square	p-value
Future employment situation of the company	37.174	< 0.001	12.841	0.046
Opinion on the future of the green economy in Silesia	56.651	< 0.001	129.151	< 0.001

Source: own study.

In the next step, the analysis was extended to include a correspondence analysis, which made it possible to identify more precisely which categories of factors are most closely related to respondents' declarations of interest in green solutions. Correspondence analysis is an exploratory technique used to analyse contingency tables, aiming to create a so-called correspondence map. This map illustrates the relationships between the categories of the variables studied – the closer the points representing these categories are to each other, the stronger the association between them. Separate analyses were carried out for the two groups – companies in the green sector and companies with green potential – and the results presented in the correspondence maps made it possible to interpret and compare them in the context of interest in green measures.

(1) The Future Employment Situation of SMEs and Propensity to Implement Green Solutions

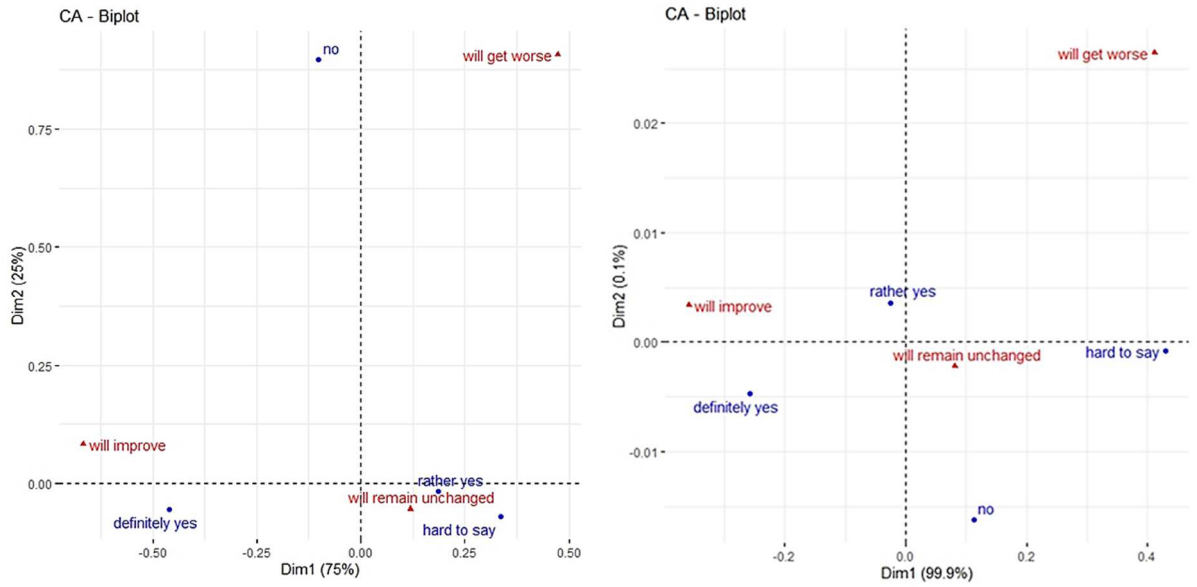
Most respondents believe that employment in SMEs with the potential to create green jobs will remain unchanged until 2027 (75.1%). Only one in five entrepreneurs believe it will increase (21.3%), while 3.6% of employers expect it to decrease. Micro entrepreneurs were more likely than other entrepreneurs to say that employment would remain the same. On the other hand, representatives of medium-sized enterprises stated that they would increase employment levels by 2027. Almost half of the employers surveyed said that they did not intend to create any new jobs by 2027 that would involve tasks contributing to the improvement of the environment (48.2%), and one in four could not answer this question (28.4%). One in four employers reported the creation of such jobs (23.4%).

Most SME green sector entrepreneurs believe that employment in their companies will remain at the current level until 2027 (80.1%). Increased employment is expected by 16.6% of entrepreneurs and a decrease by 3.3% of respondents. The distribution of answers according to metric variables makes

little difference to the respondents' opinions. We found the biggest difference among micro entrepreneurs, who are likelier than other entrepreneurs to say that employment will stay the same.

Even among enterprises with the potential to create green jobs, assessing the future employment situation still significantly influences the declaration of interest in green solutions. Figure 1 shows enterprises that intend to increase employment also favour green solutions. Enterprises that expect employment to remain at the same level are more likely to be interested in green measures. However, there is also a sub-group of enterprises that are not interested in such measures. Companies that expect to reduce their workforce are in a clear minority, and their responses are not linked to any declaration of environmental commitment.

For SME green sector entrepreneurs, the assessment of their future employment situation significantly influences the declaration of interest in green solutions. Enterprises that intend to increase employment are strongly in favour of green solutions. Enterprises that expect to maintain employment at the same level are more interested in pro-environmental measures. However, there is also a sub-group with an undefined attitude ('hard to say'). Enterprises that expect to reduce their workforce are most often not interested in pro-environmental solutions.



(a) SME green sector entrepreneurs (b) SME with the potential to create green jobs

Figure 1. Relationship between interest in green solutions and future employment situation in (a) SME green sector entrepreneurs and (b) SME with the potential to create green jobs(b)

Source: own elaboration.

The EU grants for SMEs are often intended for investments in innovative technological solutions, development of the company's infrastructure or implementation of modernisation to reduce energy consumption or generated pollution in the company.

The results of the study indicate that all analysed areas can contribute to the creation of new jobs. These positions span various business sectors and relate to producing green products or services that positively impact the environment. The study also revealed that green jobs are not yet clearly defined. In the context of green employment, there is a tendency to retrain employees and adapt their skills to meet the new environmental management requirements. Retraining processes are currently more common than creating entirely new roles related to green technologies. However, new jobs will become necessary with the implementation of various green projects and investments in industry, agriculture, and tourism.

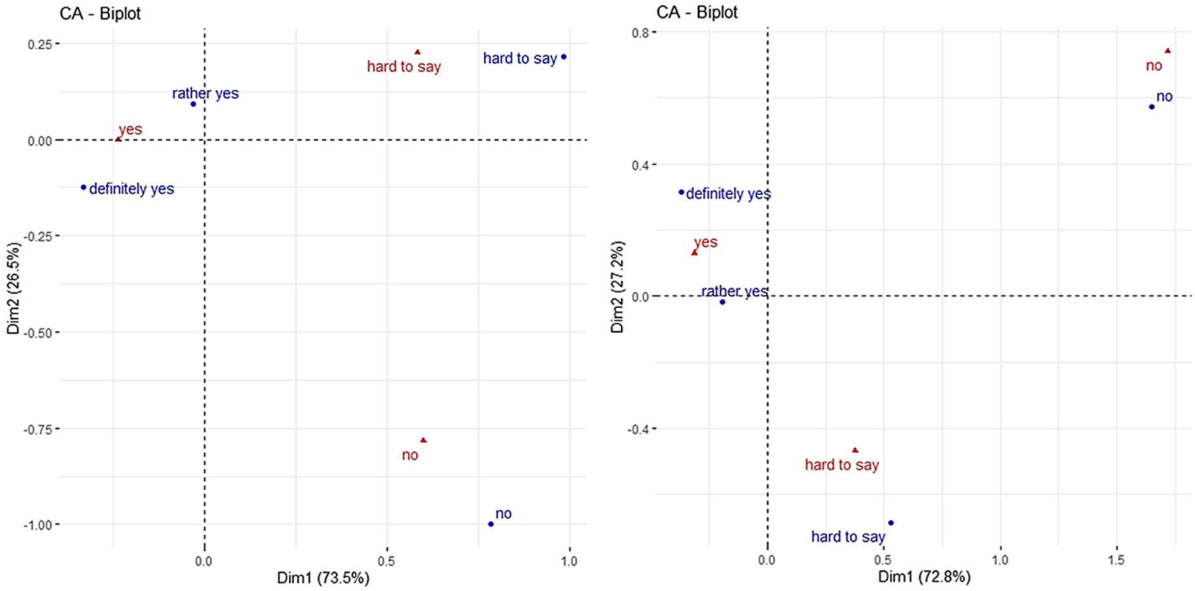
One of the key challenges highlighted by respondents is the need for environmental and pro-environmental education to prepare employees for upcoming changes. Awareness of pro-environmental actions and behaviours is becoming increasingly important. At the same time, respondents from green-

sector companies noted that, in the event of workforce reduction, they would not pursue further environmental initiatives. This may indicate that these companies have reached their maximum level of environmental development and that a decrease in employment significantly affects human resource quality, limiting the potential for implementing new solutions.

(2) Relationship Between the Interest in Pro-environmental Solutions in SME Business Models and the Level of Development of the Green Economy in the Silesian Voivodeship

As the correspondence analysis has shown, the respondents' answers concerning their opinions on the perspectives for the development of the green economy in the Silesian Voivodeship and the interest expressed by SMEs in implementing pro-environmental solutions are also significantly related (Figure 2).

Companies where it is believed that the green economy will grow by 2027 mostly declare pro-environmental sentiments ('definitely yes' and 'rather yes'). Companies undecided on the prospects of the green economy have an ambiguous attitude towards introducing environmental solutions in their business models. Companies that believe the green economy will not grow are generally not interested in environmental measures.



(a) SME green sector entrepreneurs (b) SME with the potential to create green jobs

Figure 2. Relationship between interest in pro-environmental solutions and opinions on the green economy in Silesia among green companies (a) and companies with potential (b)

Source: own elaboration.

Entrepreneurs with the potential to create green jobs mostly (66.2%) believe that Silesia's current socio-economic infrastructure allows for the successful implementation of the green economy. In comparison, only 6.0% have the opposite opinion, and the rest have no opinion. These results indicate that positive assessments are more frequent among medium and larger companies in the SME area than among micro and small enterprises. At the same time, location does not significantly affect the differences in responses. We predict the fastest growth in areas such as renewable energy, clean technologies, waste management and recycling, and public transport. In these sectors, entrepreneurs mention specific technologies and solutions such as photovoltaics, electric vehicles, energy-efficient construction and recycling systems that have the potential to support the development of sustainable practices.

In contrast, companies already operating in the green economy have an established approach to this strategy and are successfully creating green jobs. As many as 71.4% of the representatives of these companies believe that the sustainable economy will develop intensively by 2027. Positive views are particularly pronounced in medium-sized and larger companies (82.6%) of the SME sector compared to micro and small companies (64.0%). The greatest enthusiasm is for clean energy and renewable

technologies, as well as innovations in the areas of energy-efficient construction, sustainable transport and industrial technologies with a lower environmental impact.

Both groups of respondents agree that developing the green economy will be supported by simplified procedures for accessing public funding for pro-environmental activities, growing public awareness and preferential prices for environmentally friendly technologies. On the other hand, respondents identified the following elements as obstacles: high costs of pro-environmental solutions, complicated procedures for obtaining funding and laws hampering green economy activities, as well as limited public knowledge and awareness of ecology.

CONCLUSIONS

In recent years, research into the implementation of green solutions in the small and medium-sized enterprise sector has been growing in importance, especially those that relate to local economic and social development conditions. These enterprises are key to the transition to a more sustainable economy, but their potential to implement green practices is often limited by their smaller financial, organisational and human resources. The research findings presented in this article focus on analysing the determinants of green implementation by SMEs, such as employment levels, institutional support and the local level of green economy development. Also new in the literature is an examination of the impact of local and regional policies, which often determine the pace and extent of green transformation among businesses.

Furthermore, researchers have been paying increasing attention to aspects of adapting business models to a green economy's requirements and understanding entrepreneurs‘ attitudes towards pro-environmental change. In the Silesian Voivodeship, where heavy industry still plays a significant role, the study of SME entrepreneurs‘ attitudes towards green transformations is a particularly important analysis areas. Integrating factors such as the level of development of the green economy and entrepreneurs‘ perception of green solutions allows the identification of barriers and opportunities that may support the implementation of green practices in this sector in the selected geographical area.

The analysis of the research results provides valuable information on the perception of the green economy by SME entrepreneurs in Silesia. We conducted the research in two groups, *i.e.*, among companies in the green sector and those with the potential to create green jobs. Most companies with potential (66.2%) felt that the region‘s current socio-economic infrastructure was conducive to the implementation of the green economy, with medium and large companies expressing higher support. The areas considered most promising were renewable energy, clean technologies, waste management and public transport, where we expect technologies such as photovoltaics, energy-efficient construction and recycling to play a particular role.

Among companies already operating in the green economy, 71.4% are convinced that the sector‘s development will be dynamic by 2027, linked to achieving the Sustainable Development Goals. Support for the green economy is particularly high among large and medium-sized companies, although smaller entities also express interest in this development direction. However, companies operating in the western regions of the province are more sceptical about the pace of development of the green economy.

Simplified procedures for accessing public subsidies and growing public awareness of environmentalism will significantly influence the further development of the green economy. At the same time, obstacles such as the high cost of environmentally friendly technologies, complicated subsidy procedures and limited public knowledge may slow down the transformation. This trend reflects broader structural changes in the economy, similar to those resulting from the development of the knowledge economy and new technologies. The green economy increasingly contributes to the region‘s GDP, boosting green jobs and supporting sustainable socio-economic development.

The development of the green economy in Silesia faces both promising prospects and significant challenges. It is worth supporting and simplifying access to public funding and creating preferential pricing conditions for environmentally friendly technologies, which can increase interest among businesses of all sizes. At the same time, the issues require public awareness and environmental education to prepare both employees and the wider public for the coming changes in the economy. We also

recommend to simplify procedures related to obtaining subsidies for pro-environmental activities and adjusting legal regulations, which can significantly accelerate the implementation of green solutions and increase their attractiveness among the region's enterprises.

The survey on the perception of SME development in the context of the implementation of so-called green solutions, faces several important limitations that may affect the depth and generalisability of the results. One of the main limitations is the use of a survey methodology only, which, although it allows for the collection of a broad spectrum of opinions, limits a more in-depth understanding of the complex aspects of the topic under study. The main limitation of this study is the reliance on data from field surveys conducted in the Silesian Voivodeship, which, while providing valuable information, may not cover the full range of factors influencing the implementation of the green economy by SMEs in different regions or industries. The focus on the Silesian context means that the findings may not be fully generalisable to other regions undergoing less intensive economic transition or have different support instruments than the Just Transition Fund. Extending the research to additional regions would provide a more comprehensive view of the impact of the green economy on SMEs and the differentiation of support mechanisms between regions.

Further research could analyse in detail the development of green competencies among SMEs, especially regarding the long-term effects of green initiatives and their economic, environmental, and social impact. It is also worth investigating how the different levels of awareness and preparation of SME managers affect the implementation of green economy technologies and strategies. Future research also recommends extending the analysis to other regions of Poland and including in-depth interviews with managers to better understand the practical application of so-called green solutions in different industries. Furthermore, an analysis of the impact of the changing regulatory landscape, especially in the context of the introduction of due diligence requirements for sustainable business development, could provide valuable information to support policy and business practices.

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Conflict of Interest

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