

Exploring ESG Perceptions through Firm Demographics: A Quantitative Study in V4 SMEs

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ABSTRACT

Research background: ESG principles are increasingly integral to corporate strategy, particularly within the European Union. While large corporations often have the capacity to meet ESG requirements, SMEs face structural limitations. In the context of the V4 countries, there is limited empirical evidence on how firm demographics influence ESG perception and implementation.

Purpose of the article: The article aims to analyze how firm size, sector, and business duration shape SMEs' perceptions of ESG and its three pillars. The study seeks to quantify these relationships and provide insights into demographic determinants of ESG alignment.

Methods: A quantitative survey was conducted in February 2024 using the CAWI method across SMEs in the Czech Republic, Slovakia, Hungary, and Poland. A total of 1,320 responses were collected and evaluated using correlation analysis and linear regression modelling. ESG attitudes were measured on a 5-point Likert scale, and statistical tests were conducted at a 5% significance level.

Findings & Value added: Firm size, sector, and age were statistically significant predictors of ESG perception, though the explained variance was modest. Larger firms showed consistently stronger alignment with ESG—particularly in environmental and social dimensions—while older firms expressed lower support, possibly due to legacy constraints. Sectoral differences were most notable in environmental and governance perceptions, with manufacturing firms demonstrating higher engagement. Governance was less sensitive to firm demographics, suggesting it may be perceived as a baseline compliance requirement. The findings highlight the need for differentiated ESG frameworks and support mechanisms tailored to SMEs' capacities and sectoral contexts. This study contributes to ESG literature by offering new evidence from the V4 region and suggesting policy directions for more inclusive sustainability practices.

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INTRODUCTION

In recent years, Environmental, Social, and Governance (ESG) considerations have gained substantial traction across industries, particularly within the European context. ESG is a strategic framework that evaluates a company's commitment to sustainability and ethical conduct in three primary domains: environmental responsibility, social impact, and corporate governance (European Commission, 2024; Khan et al., 2024). As global economic activity increasingly intersects with pressing ecological and social issues, the integration of ESG factors into

business strategy has become a cornerstone of responsible corporate conduct.

Within the European Union, legislative directives and stakeholder expectations have elevated ESG from a voluntary corporate social responsibility initiative to a regulated, measurable standard of sustainable practice. ESG reporting serves not only as a communication tool for firms but also as a determinant of investment attractiveness, risk management capability, and overall corporate credibility (Gillan et al., 2021; Bifulco et al., 2023). For small and medium-sized enterprises (SMEs), the ESG agenda represents both an opportunity and a challenge.

On one hand, ESG adoption can foster competitiveness, enhance stakeholder trust, and open access to green finance. On the other hand, SMEs often face constraints in terms of financial resources, managerial capacity, and regulatory awareness, which may limit their ability to fully embrace ESG frameworks (Zhu & Huang, 2023; Shalhoob & Hussainey, 2023).

This article aims to define and quantify how firm demographic variables—specifically sector, company size, and business duration—influence the perception and adoption of ESG concepts and their environmental (E), social (S), and governance (G) pillars. Although research on ESG implementation among large corporations is abundant, limited empirical studies investigate how SMEs perceive and respond to ESG imperatives, particularly in the context of the Visegrad Four (V4) countries: the Czech Republic, Slovakia, Hungary, and Poland.

Drawing on legitimacy and stakeholder theory, this article contributes to bridging that gap. It explores the unique motivations, limitations, and demographic influences shaping ESG engagement among SME managers. Empirical insights derived from this study will inform not only academic discourse but also policymakers, investors, and SME leaders who are navigating the evolving landscape of sustainable business transformation.

Despite the increasing volume of ESG research, a notable gap persists regarding how firmographic characteristics shape the perception and adoption of ESG principles among SMEs, especially within transitional economies of Central Europe. Prior studies have predominantly concentrated on large corporations or Western European contexts, overlooking how structural factors such as firm size, sector, and business duration influence smaller firms' engagement with ESG frameworks.

This study addresses that research gap by providing empirical evidence from the Visegrad Four region, which represents a dynamic yet underexplored segment of the European business landscape. By analysing firm-level differences, it offers a novel contribution to the ESG literature through the integration of firmographic analysis with managerial perception data. The study's originality lies in its focus on SMEs' internal perspective—how managers interpret and operationalize ESG principles rather than how they report them externally.

Building on the theoretical underpinnings of legitimacy theory and stakeholder theory, the research seeks to answer the following overarching question: “How do firm demographic factors – sector, size, and business duration – affect SMEs' perception and adoption of ESG principles across the Visegrad countries?” To address this question, the study develops and empirically tests four hypotheses that examine the relationship between firm demographics and perception of the ESG pillars.

THEORETICAL BACKGROUND

Theoretical reflections on ESG reveal its transformation from a voluntary, morally driven initiative into a core stra-

tegic framework for sustainable corporate governance. ESG, representing Environmental, Social, and Governance dimensions, has evolved as a multidimensional tool to assess non-financial performance, helping firms align with broader sustainability goals while addressing stakeholder expectations (Gillan et al., 2021; Asif et al., 2023). While its roots are embedded in the broader legacy of Corporate Social Responsibility (CSR), ESG emphasizes measurable, reportable outcomes and places governance on par with environmental and social metrics (Bifulco et al., 2023; Wang & Hou, 2024). In contrast to CSR, which often remains qualitative and value-driven, ESG metrics are now increasingly integrated into financial analysis, investment decisions, and credit risk assessments (Khan et al., 2024; Garrido-Ruso et al., 2024).

This shift is particularly pertinent in the European context, where regulatory frameworks such as the EU Taxonomy and the Corporate Sustainability Reporting Directive (CSRD) mandate structured ESG disclosures for an expanding group of enterprises (European Commission, 2024). However, small and medium-sized enterprises (SMEs)—despite their vital economic role—face disproportionate burdens in ESG implementation due to constrained resources, lack of expertise, and low regulatory preparedness (Zhu & Huang, 2023; Betakova et al., 2023). This creates a disparity between large enterprises, which often have dedicated sustainability teams and established reporting systems, and SMEs, which typically lack the institutional infrastructure to support such transitions (Belás et al., 2016; Shalhoob & Hussainey, 2023).

Recent research also confirms the strategic value of ESG adoption, with positive correlations reported between ESG maturity and firm resilience, market access, innovation capability, and investor trust (Gjergji et al., 2021; Liu et al., 2023). ESG performance is no longer simply reputational—it is linked to risk management, regulatory compliance, and competitive positioning (Narula et al., 2023). Consequently, companies that embed ESG principles into their strategic fabric demonstrate higher adaptability in volatile contexts, such as during regulatory change or environmental crises (Fu & Li, 2023; Ayuso & Navarrete-Báez, 2018).

Nonetheless, ESG implementation is not monolithic. Variability arises across regions, industries, and firm sizes, with demographic factors playing a significant role in shaping ESG perception and execution. This heterogeneity suggests a need for flexible ESG models tailored to firm-specific characteristics, especially for SMEs operating across different sectors and life cycle stages (Zvarikova et al., 2024; Belás et al., 2024). The next sections unpack how ESG's individual pillars—environmental, social, and governance—interact with SME behavior, especially through the lens of perceived barriers and incentives.

The environmental component of ESG (Pillar E) addresses how companies interact with ecological systems and manage their environmental externalities, such as emi-

ssions, resource consumption, and biodiversity impacts (Cardillo et al., 2022; Gu et al., 2023). For small and medium-sized enterprises (SMEs), engaging with the environmental dimension presents both strategic opportunities and operational challenges. Although SMEs are often characterized by agility and proximity to local communities, their limited access to capital and technical expertise makes ESG implementation more difficult compared to larger corporations (Zhu & Huang, 2023; Shalhoob & Hussainey, 2023).

SMEs that actively engage with environmental sustainability stand to gain in multiple areas. First, adopting green technologies—such as energy-efficient production processes, waste minimization, and renewable energy integration—can directly reduce operational costs (Bak et al., 2022; Dzomonda, 2022). Second, firms that demonstrate commitment to ecological responsibility improve their brand image, enhance customer loyalty, and access green financing mechanisms such as subsidies or ESG-linked loans (Machova et al., 2023; Yoo et al., 2024). Moreover, a well-articulated environmental policy is increasingly essential for supply chain inclusion, as large firms often impose sustainability standards on SME suppliers (European Commission, 2024; Hazbi & Mounir, 2023).

However, barriers remain significant. SMEs face difficulties in measuring environmental performance due to lack of standardized metrics, high upfront investment costs for eco-innovation, and inadequate human capital (Zhang & Jin, 2022; Khalil & Nimmanunta, 2023). These challenges are exacerbated by regulatory complexity and the absence of a tailored ESG framework that reflects SMEs' unique characteristics (Zumente & Bistrova, 2021). Furthermore, phenomena like greenwashing undermine trust in corporate sustainability claims. Many SMEs fear reputational damage if their ESG practices are perceived as symbolic rather than substantive (Yu et al., 2020; Todaro & Torelli, 2024).

Despite these challenges, SMEs' environmental strategies can drive both financial and non-financial performance. Firms that embed ecological innovation into core strategy experience not only cost reductions but also entry into new markets through green product development (Vannoni & Ciotti, 2020; Ozkan et al., 2023). Moreover, integration of environmental principles fosters organizational learning, supports compliance with emerging regulations, and enhances resilience in the face of climate-related risks (Zeng & Jiang, 2023; Doni & Fiameni, 2024).

In summary, although ESG's environmental pillar presents a complex set of requirements for SMEs, it also offers long-term competitive advantages. Effective engagement with Pillar E requires not only financial resources but also strategic foresight, managerial commitment, and stakeholder collaboration. The next section explores the social pillar, which expands the ESG conversation to include stakeholder trust, community integration, and employee engagement.

The social pillar of ESG (Pillar S) encompasses the human and relational dimensions of corporate operations, including employee well-being, labor practices, diversity, community involvement, and customer responsibility (Gillan et al., 2021; Khan et al., 2024). For small and medium-sized enterprises (SMEs), social performance is often closely tied to local legitimacy, employee retention, and stakeholder trust. While many SMEs lack formalized social policies, their flatter hierarchies and community-rooted structures allow for more personal, flexible engagement with stakeholders (Kot, 2023).

Employee satisfaction and internal communication play critical roles in ESG success. Research confirms that SMEs that foster inclusive and ethical work environments experience higher levels of employee engagement and productivity (Gjergji et al., 2021). Social-oriented practices—such as flexible work arrangements, professional development programs, and fair remuneration—enhance workplace morale and align employee values with firm mission (Zvarikova et al., 2024; Liu et al., 2023). This alignment is especially relevant when employees are involved in sustainability initiatives, such as green training or community volunteering, which can reinforce organizational culture and sustainability literacy (Skousen & Sun, 2019; Wang & Sun, 2022).

Stakeholder theory suggests that firms that manage their relationships with customers, suppliers, and local communities responsibly are more likely to gain long-term support and mitigate reputational risk (Asif et al., 2023; Garrido-Ruso et al., 2024). SMEs that actively engage in community development and social responsibility projects benefit from increased legitimacy, consumer preference, and social capital (Alduais, 2023; Mitra & Bui, 2024). This is particularly salient in regional economies where SMEs are closely embedded in the socio-economic fabric and any breach of trust—such as labor rights violations or discriminatory practices—can have disproportionate consequences.

However, despite these advantages, the absence of formal ESG training, resource scarcity, and low awareness often impede consistent and measurable social performance in SMEs (Homroy et al., 2023; Chouaibi et al., 2022). Moreover, performance evaluation for social aspects is complicated by the qualitative nature of many indicators (e.g., culture, well-being), which are harder to quantify and standardize across firms (Habib, 2023; Khalil & Nimmanunta, 2023). Transparency is another concern; without clear reporting frameworks, stakeholders may remain unaware of a firm's social contributions, thereby limiting the reputational returns of their efforts (Gu et al., 2023; Sahin et al., 2023).

Nonetheless, empirical evidence shows that socially responsible SMEs tend to outperform their peers in resilience, stakeholder retention, and innovation (Belás et al., 2024; Lee et al., 2023). They are also more likely to receive favorable evaluations from customers and regulators, especially in industries where social impact is material (e.g., healthcare, education, food production). In sum,

effective engagement with the social pillar enhances trust, loyalty, and long-term viability—particularly when aligned with ethical governance and transparent reporting.

The governance pillar (Pillar G) represents the backbone of ESG, encompassing the structures, processes, and practices by which companies are directed and controlled. It includes transparency, board diversity, accountability, executive compensation, internal controls, and adherence to legal frameworks (Gillan et al., 2021; Homroy et al., 2023). In the context of SMEs, governance is often less formalized than in large corporations, yet its influence on ESG credibility and performance is no less critical. Sound governance ensures that environmental and social commitments are not merely symbolic but are embedded in organizational strategy and decision-making (Acar & Coskun, 2023; Gholami et al., 2022).

One major governance concern within ESG discourse is the phenomenon of “greenwashing”—the practice of overstating or falsifying environmental or social responsibility claims (Dumitrescu et al., 2022; Todaro & Torelli, 2024). SMEs are particularly vulnerable to accusations of greenwashing due to their limited reporting capabilities, lack of formal control systems, and inconsistent ESG disclosures (Mitra & Bui, 2024; Momtaz & Parra, 2025). Studies indicate that firms with strong internal governance frameworks, including ESG-linked performance evaluations and audit functions, are less likely to misrepresent their sustainability practices (Gu et al., 2023; Sahin et al., 2023).

Transparency in ESG reporting enhances both internal discipline and external trust. Companies that disclose verifiable, consistent data are more likely to attract investors, reduce financing costs, and improve their reputational capital (Chouaibi et al., 2022; Habib, 2023). For SMEs, this implies the need to develop reporting mechanisms—however modest—that reflect their sustainability progress and compliance with relevant legislation (European Commission, 2024). The implementation of digital ESG dashboards and third-party verifications can further strengthen the credibility of disclosures and facilitate benchmarking (Gholami et al., 2022; Doni & Fiameni, 2024).

Board composition is another critical aspect of governance. Evidence suggests that gender and cultural diversity among board members is positively correlated with ESG performance and ethical decision-making. Diverse boards are more likely to consider broader stakeholder perspectives and reduce instances of corporate misconduct. While many SMEs lack formal boards, encouraging inclusive leadership and participatory decision-making can replicate these benefits at a smaller scale (Gjergji et al., 2021; Liu et al., 2023).

A final element of governance is incentive alignment. Linking managerial rewards to ESG outcomes—beyond traditional profit metrics—has been shown to enhance long-term orientation and reinforce ethical conduct (Lee et al., 2023; Homroy et al., 2023). Though such systems

are rare in SMEs, emerging models propose integrating qualitative ESG metrics into performance reviews, thereby nudging management behavior toward sustainable practices without requiring costly infrastructure (Narula et al., 2023).

To summarize, robust governance is indispensable for the credibility and effectiveness of ESG strategies. For SMEs, investing in basic governance structures, enhancing transparency, and aligning incentives can dramatically elevate ESG performance, minimize reputational risk, and prepare firms for future regulatory demands.

Firm demographic factors—such as sector affiliation, company size, and business duration—play a pivotal role in shaping how ESG is perceived and implemented, particularly among SMEs. Unlike standardized regulatory approaches, these variables introduce heterogeneity in ESG engagement, creating differentiated paths to sustainability integration. Research confirms that firms from environmentally sensitive sectors (e.g., manufacturing, agriculture) tend to prioritize environmental disclosure more intensively, due to greater scrutiny from regulators, consumers, and investors (Wang & Sun, 2022; Zhou et al., 2020). Conversely, service-oriented SMEs may emphasize social or governance issues, reflecting the relational nature of their business models (Zou et al., 2024).

Company size also influences ESG perception and capacity. Larger SMEs are typically more capable of absorbing the fixed costs associated with ESG reporting, sustainability audits, and staff training (Zhu & Huang, 2023; Ronalter et al., 2022). They may benefit from economies of scale in implementing green technologies and are more likely to have formal governance structures that support systematic ESG engagement (Gjergji et al., 2021; Zvarikova et al., 2024). In contrast, microenterprises often approach ESG informally—relying on intuitive practices, founder values, and community embeddedness rather than structured reporting frameworks (Belás et al., 2016; Belás et al., 2024). This discrepancy underlines the need for proportional ESG expectations, where regulatory and reporting burdens are matched to firm capabilities.

Business duration adds another layer of complexity. Older firms may possess more institutional knowledge, established stakeholder relationships, and reputational capital that support ESG consistency (Garrido-Ruso et al., 2024; Lei & Yu, 2024). However, they may also exhibit organizational inertia, resistance to innovation, and legacy systems that complicate ESG integration. Younger firms, while typically more agile and technologically enabled, may lack historical data or mature governance systems to support robust ESG disclosure (Liu et al., 2023; Narula et al., 2023). Their ESG efforts may be shaped more by external signaling motives—seeking to attract investors or position themselves competitively—rather than deep-rooted sustainability values (Hussainey & Shalhoob, 2022).

These demographic influences also intersect. For instance, a medium-sized manufacturer operating for over 20

years may have both the regulatory exposure and organizational stability to adopt advanced ESG systems, while a small digital startup may focus on ad hoc environmental or social practices tailored to customer expectations. Empirical studies support these patterns, noting that ESG maturity is positively associated with size and age but varies significantly across sectors (Zou et al., 2024; Khalil & Nimmanunta, 2023).

Understanding how demographic characteristics influence ESG perception is essential for policymakers and support institutions aiming to foster inclusive sustainability transitions. Uniform ESG mandates may inadvertently penalize smaller or newer firms. Therefore, segmented policies and sector-specific tools—such as simplified reporting templates, targeted subsidies, and ESG education—are necessary to ensure that all SMEs can meaningfully engage with the ESG agenda (Alduais, 2023; Tsang et al., 2023; Yoo et al., 2024).

Synthesizing the reviewed literature reveals that while ESG research has matured conceptually, the interaction between firmographic determinants and ESG perception remains insufficiently theorized. Previous studies have tended to examine ESG drivers either at the macro-institutional level (e.g., regulation, investor pressure) or at the micro-organizational level (e.g., leadership, culture), but have rarely integrated demographic dimensions as mediating factors.

On this theoretical basis, the present study formulates a structured set of research hypotheses linking firm size, sector, and business duration to ESG perception and practice among SMEs. This theoretical framing not only grounds the empirical analysis but also extends existing ESG models by introducing demographic differentiation as a contextual layer influencing sustainability behaviour.

RESEARCH OBJECTIVE, METHODOLOGY AND DATA

The aim of this article is to define and quantify the impact of firm demography factors – sector, size and business duration on the ESG concept perception, and perception on E, S and G pillars from the perspective of SME managers.

As part of a broader research initiative examining the attitudes of managers and business owners toward sustainability, a quantitative, cross-sectional survey was conducted in February 2024 across the Czech Republic, Slovakia, Poland, and Hungary. Data were collected using the Computer-Assisted Web Interviewing (CAWI) technique, which ensured standardization and broad reach while minimizing interviewer bias. The survey platform included verification mechanisms to prevent automated or duplicate responses. To enhance cross-national comparability, the questionnaire was translated and adapted for each national context, with linguistic and conceptual equivalence ensured through back-translation. Each section of the survey included control and consistency-check questions to detect random or contradictory responses. Participants evaluated a series of state-

ments using a five-point Likert scale, with response options defined as follows: 1 – strongly agree, 2 – somewhat agree, 3 – neither agree nor disagree, 4 – somewhat disagree, and 5 – strongly disagree.

Research team defined dependent [y] and independent variables [x].

- y1: Our company supports the ESG concept and applies it in its business activities.
- y2: Our company intensively addresses and minimises environmental impacts.
- y3: The company applies fair practices in relation to its employees (it has job descriptions, complies with health and safety regulations, provides a safe working environment for employees, and has career plans in place).
- y4: Our company complies with all national and international laws and regulations that apply to us.
- x1: firm size
- x2: sector
- x3: business duration

The hypotheses outlined below were developed in response to the preceding statements:

- H1*: Support for the ESG concept in a company is significantly influenced by the size of the company, the sector and the length of time it has been in business.
- H2*: Intensive minimisation of the environmental impact of business is significantly influenced by the size of the company, the sector and the length of time it has been in business.
- H3*: The application of fair practices in relation to employees is influenced in the company by the size of the company, the sector and the length of time it has been in business.
- H4*: Compliance with all relevant laws and regulations is significantly influenced by the size of the company, the sector and the length of time it has been in business.

To investigate the mutual associations among the variables under consideration, a correlation analysis was conducted. To determine the statistical relevance and examine the influence of firms' demographic characteristics on the perception of ESG, linear regression modelling (LRM) was applied. All hypotheses were tested using a significance level of $\alpha = 0.05$. Within the framework of the quantitative research design, respondents' answers were measured using a five-point Likert scale and subsequently analysed through LRM procedures. It was hypothesized that higher ratings of the independent variables would be associated with more positive evaluations of the dependent variable, indicating that business owners and top-level executives from the Visegrád countries form their assessments of y based on the explanatory variables x_1 through x_3 .

Table 1: values form questionnaire

value	size	sector	duration
1	micro	manufacturing	less 5 years
2	small	trade	from 5 to 10 years
3	medium	services	more than 10 years
4	large	construction	-
5	-	transport	-
6	-	agriculture	-
7	-	tourism	-
8	-	other	-

Source: own processing

The analysis proceeded in several steps:

1. Descriptive analysis was first used to summarize the structure of the dataset and to verify the distribution of firmographic variables (see Table 1).
2. Correlation analysis was conducted to explore the strength and direction of associations among variables and to identify potential multicollinearity issues.
3. Linear Regression Modelling (LRM) was then applied to estimate the influence of firmographic characteristics (x_1 – x_3) on each dependent ESG perception variable (y_1 – y_4).
4. All hypotheses were tested at a significance level of $\alpha = 0.05$.

RESULTS

The sample analysis confirmed that the number of surveyed enterprises from the Visegrád Group (V4) countries ($n = 1,320$) more than doubled the minimum required threshold ($n = 684$), thereby supporting the sample's representativeness. Respondents were selected through a random sampling procedure.

Country-wise distribution of participants was as follows: the Czech Republic contributed 338 respondents (25.61%), Poland 349 (26.44%), Slovakia 312 (23.64%), and Hungary 321 (24.32%). With respect to enterprise size, the sample included 560 micro-enterprises (42.42%), 312 small enterprises (23.64%), 253 medium-

sized firms (19.17%), and 195 large businesses (14.77%).

Sectoral representation showed a predominance of firms operating in the service sector (462 firms, 35.00%) and trade (260 firms, 19.70%). These were followed by manufacturing (215 firms, 16.29%), construction (143 firms, 10.83%), transport (52 firms, 3.94%), tourism (34 firms, 2.58%), and agriculture (21 firms, 1.59%). An additional 133 firms (10.08%) reported activity in other sectors. In terms of respondent demographics, 629 individuals (47.65%) identified as male, while 691 (52.35%) were female.

The assumption of normality was confirmed based on descriptive statistical indicators—specifically skewness and kurtosis—whose values fell within the acceptable range of -2 to $+2$.

The dataset comprises responses from 1,320 firms across the V4 countries, examining their perceptions of ESG and its subdimensions in relation to selected firm characteristics, namely size, sector, and duration of operation. Descriptive statistics in table 2 reveal that the average firm in the sample is relatively small ($M = 2.06$) and mostly with business duration between 5-10 years ($M = 2.10$). Based on kurtosis and skewness values, the dataset is normally distributed (values <-2 ; >2). The results of the correlation analysis at the significance level $\alpha = 0.05$ confirmed that the relationship between demographic factors and ESG variables is very weak, whether positive or negative ($c = <-0.1924$; 0.1315).

The regression model for ESG concept support in table 3 is statistically significant (Regression P-value < 0.0001). Only 6.5% of the variance in ESG perception can be explained by the combination of size, sector, and duration. Each factor is significantly influencing the ESG implementation. The linear regression model demonstrates statistically significant effects of firm size, sector, and duration on ESG perception, with all predictors contributing at the $\alpha = 0.05$ level.

When adjusting for the directional structure of the Likert scale – where lower values indicate stronger agreement with ESG statements – it becomes clear that larger firms

Table 2: descriptive and correlation analysis

DESCRIPTIVE	size	sector	duration	ESG	E	S	G
Mean	2.0629	3.3189	2.1045	2.5962	2.2189	1.9947	1.6947
Std. Error	0.0302	0.0557	0.0232	0.0314	0.0289	0.0262	0.0223
Std. Deviation	1.0972	2.0224	0.8413	1.1405	1.0506	0.9534	0.8084
Sample Variance	1.2038	4.0900	0.7078	1.3008	1.1037	0.9090	0.6535
Kurtosis	-1.0855	0.5736	-1.5595	-0.4154	0.1489	0.8405	1.6934
Skewness	0.5480	1.1697	-0.1993	0.4209	0.7525	0.9568	1.1959
Count	1320	1320	1320	1320	1320	1320	1320
CORRELATION	size	sector	duration	ESG	E	S	G
ESG	-0.1924	0.1315	0.0962	1			
E	-0.1817	0.1227	0.0350	0.5566	1		
S	-0.0954	0.0779	0.0451	0.3906	0.4803	1	
G	-0.0382	0.0888	-0.0266	0.2732	0.3787	0.5094	1

Source: own processing

Table 3: Regression analysis for ESG concept support

REGRESSION	Multiple R	R Square	Adj. R Sqr.	Std. Error	Observations
	0.2553	0.0652	0.0630	1.1040	1320
ANOVA	df	SS	MS	F	P-value
Regression	3	111.7965	37.2655	30.5747	<0.0001
Residual	1316	1603.9846	1.2188		
Total	1319	1715.7811			
COEFFICIENTS		Std. Error	t Stat	P-value	
Intercept	2.4740	0.1068	23.1685	<0.0001	
size	-0.2118	0.0283	-7.4727	<0.0001	
sector	0.0587	0.0151	3.8739	0.0001	
duration	0.1731	0.0368	4.7067	<0.0001	

Source: own processing

Table 4: Regression analysis for E pillar

REGRESSION	Multiple R	R Square	Adj. R Sqr.	Std. Error	Observations
	0.2181	0.0476	0.0454	1.0264	1320
ANOVA	df	SS	MS	F	P-value
Regression	3	69.2573	23.0858	21.9124	<0.0001
Residual	1316	1386.4692	1.0535		
Total	1319	1455.7265			
COEFFICIENTS		Std. Error	t Stat	P-value	
Intercept	2.2401	0.0993	22.5640	<0.0001	
size	-0.1742	0.0264	-6.6119	<0.0001	
sector	0.0522	0.0141	3.7038	0.0002	
duration	0.0785	0.0342	2.2940	0.0219	

Source: own processing

Table 5: Regression analysis for S pillar

REGRESSION	Multiple R	R Square	Adj. R Sqr.	Std. Error	Observations
	0.1311	0.0172	0.0149	0.9463	1320
ANOVA	df	SS	MS	F	P-value
Regression	3	20.5999	6.8666	7.6687	<0.0001
Residual	1316	1178.3629	0.8954		
Total	1319	1198.9629			
COEFFICIENTS		Std. Error	t Stat	P-value	
Intercept	1.9282	0.0915	21.0671	<0.0001	
size	-0.0860	0.0243	-3.5402	0.0004	
sector	0.0305	0.0130	2.3500	0.0189	
duration	0.0678	0.0315	2.1502	0.0317	

Source: own processing

Table 6: Regression analysis for G pillar

REGRESSION	Multiple R	R Square	Adj. R Sqr.	Std. Error	Observations
	0.0968	0.0094	0.0071	0.8055	1320
ANOVA	df	SS	MS	F	P-value
Regression	3	8.0818	2.6939	4.1519	0.0061
Residual	1316	853.8811	0.6488		
Total	1319	861.9629			
COEFFICIENTS		Std. Error	t Stat	P-value	
Intercept	1.6683	0.0779	21.4134	<0.0001	
size	-0.0178	0.0207	-0.8612	0.3893	
sector	0.0349	0.0111	3.1590	0.0016	
duration	-0.0251	0.0268	-0.9347	0.3501	

Source: own processing

are significantly more likely to express positive attitudes toward ESG (coef. = -0.2118 , $p < 0.0001$). That is, as firm size increases, average Likert scores decrease, reflecting a stronger level of agreement and thus greater ESG alignment. In contrast, firms operating in sectors with higher classification codes (e.g., services, tourism, or miscellaneous industries) tend to exhibit higher Likert scores (coef. = 0.0587 , $p = 0.0001$), implying a weaker endorsement of ESG values. This may reflect a lower perceived relevance of ESG in these contexts or a lag in stakeholder pressure relative to sectors such as manufacturing.

Furthermore, older firms (coef. = 0.1731 , $p < 0.0001$) – contrary to what might be assumed – show significantly higher scores, suggesting a more critical or hesitant stance toward ESG implementation. This challenges the often – assumed positive link between organizational maturity and sustainability commitment and may point to path dependence, legacy systems, or entrenched practices.

Taken together with the correlation analysis, these findings suggest that larger but younger firms in traditional sectors such as manufacturing are most positively aligned with ESG, while smaller, older firms in more service-oriented industries may display greater scepticism or ambivalence.

The regression model for E pillar in table 4 is statistically significant (Regression P-value < 0.0001). Based on Adj. R. Sqr, only 4.5% of the variance in E pillar perception can be explained by the combination of size, sector, and business duration. Controlling for the structure of the Likert scale (where lower scores denote stronger agreement) results indicate that larger firms express more favourable attitudes toward environmental initiatives (coef. = -0.1742 , $p < 0.0001$). This may stem from higher regulatory pressure, better access to green technologies, or a greater need to report sustainability metrics.

By contrast, firms operating in less traditional or service-based sectors show less engagement with environmental concerns (coef. = $+0.0522$, $p = 0.0002$), suggesting either lower perceived relevance or limited operational integration of environmental practices. Moreover, older firms demonstrate a statistically significant but weaker negative alignment with the environmental agenda (coef. = $+0.0785$, $p = 0.0219$), reinforcing the notion that legacy systems or institutional inertia may hinder sustainability transformation over time.

Compared to the overall ESG model, these results show that size remains a consistently strong positive predictor, while duration and sector-specific variation play a more nuanced role in shaping environmental responsibility perceptions across firms in the V4 region.

The regression model for S pillar in table 5 is statistically significant (Regression P-value < 0.0001). The model explains approximately 1.7% of the variability in attitudes towards the social pillar of ESG. Although the model has low predictive power, it is statistically significant. The

regression model assessing firms' attitudes toward the social dimension of ESG (defined here as the adoption of fair labour practices) reveals several statistically significant associations with basic firm demographics.

Specifically, larger firms express stronger support for fair treatment of employees (coef. = -0.0860 , $p = 0.0004$), reflected in lower average Likert scores, which correspond to stronger agreement with the positively worded items. This may reflect the institutionalization of human resource policies, compliance with labour standards, or stakeholder expectations placed on larger entities. Sectoral variation is also evident (coef. = $+0.0305$, $p = 0.0189$), with firms in higher-coded sectors (such as services, tourism, or agriculture) showing less favourable attitudes toward social ESG practices. This finding may reflect varying organizational priorities, workforce dynamics, or regulatory exposure across industries.

Lastly, older firms (coef. = $+0.0678$, $p = 0.0317$) demonstrate less enthusiastic support for social responsibility initiatives relative to their younger counterparts. Though this effect is less pronounced than in the overall ESG model, it suggests a possible resistance to change, reliance on legacy practices, or diminished responsiveness to evolving social norms.

When triangulated with findings from the Environmental and overall ESG models, the results confirm that larger firms consistently exhibit stronger ESG alignment, while sector and duration introduce more nuanced, often limiting influences, particularly in the social domain.

The regression analysis for G pillar in table 6 targeting the governance dimension of ESG (operationalized here as adherence to applicable laws and regulations) demonstrates that only sectoral affiliation significantly predicts firms' self-assessed legal compliance. Although the overall model reaches statistical significance (p -value = 0.0061), its explanatory power remains minimal (Adj. R. Sqr = 0.0072), underscoring the relative uniformity of responses or influence from unmeasured factors.

Specifically, firms in service-oriented or miscellaneous sectors exhibit less favourable attitudes toward this pillar (coef. = $+0.0349$, $p = 0.0016$), as indicated by higher Likert scores (i.e., greater disagreement with the statement regarding full legal compliance). This may be attributed to lower internal standardization, fewer regulatory frameworks, or more fragmented compliance mechanisms in these industries.

By contrast, firm size (coef. = -0.0178 , $p = 0.3893$) and firm age (coef. = -0.0251 , $p = 0.3501$) do not significantly affect perceptions of governance practices, suggesting that legal adherence is broadly expected and internalized regardless of a firm's scale or maturity.

In comparison with the Environmental and Social pillars, where all predictors were significant, the Governance pillar appears less discriminating – highlighting it as a baseline expectation across sectors rather than a domain where firm demographics play a substantial role.

Table 7: hypotheses overview & regression models

	H1	H2	H3	H4
size	A	A	A	R
sector	A	A	A	A
duration	A	A	A	R
Model ESG	$y = 2.4740 - 0.2118 x_1 + 0.0587 x_2 + 0.1731 x_3$			
Model E	$y = 2.2401 - 0.1742 x_1 + 0.0522 x_2 + 0.0785 x_3$			
Model S	$y = 1.9282 - 0.0860 x_1 + 0.0305 x_2 + 0.0678 x_3$			
Model G	$y = 1.6683 - 0.0178 x_1 + 0.0349 x_2 - 0.0251 x_3$			

Note: A – hypothesis accepted; R – hypothesis rejected

Source: own processing

DISCUSSION

This study sought to examine the extent to which firmographic characteristics—namely firm size, sector affiliation, and duration of operation—shape the perception and adoption of ESG principles among SMEs in the Visegrad Four region. The theoretical framework anticipated that these variables would significantly influence ESG engagement, based on established research that links larger firm size and organizational maturity with greater capacity to institutionalize sustainability practices. Larger firms, for example, are believed to benefit from greater access to resources, formal governance structures, and regulatory incentives that facilitate ESG integration (Zhu & Huang, 2023; Gjergji et al., 2021). Similarly, older firms were expected to draw upon reputational capital and stakeholder relationships to embed ESG into their strategic priorities (Garrido-Ruso et al., 2024; Lei & Yu, 2024).

The empirical findings partly support these assumptions. All three variables—size, sector, and age—were statistically significant predictors of ESG perception. However, the strength of their influence was weak, indicating that although demographic factors matter, they explain only a small portion of variance in ESG attitudes. This aligns with more recent scholarship that emphasizes the heterogeneity of ESG adoption pathways and cautions against applying uniform assumptions to diverse SME contexts (Zvarikova et al., 2024; Belás et al., 2024).

A clearer confirmation of theoretical expectations emerged within the environmental pillar. The data show that larger firms are more positively aligned with environmental initiatives, consistent with arguments that such firms are better positioned to absorb the fixed costs associated with green technology and reporting requirements (Bak et al., 2022; Doni & Fiameni, 2024). Sector affiliation also played a role, with manufacturing and other traditional sectors displaying stronger environmental engagement compared to service-based industries, which are often less exposed to ecological scrutiny (Wang & Sun, 2022). The finding that older firms were more hesitant in their environmental commitments challenges the view that institutional maturity supports sustainability, and instead suggests that legacy systems and organizational inertia

may inhibit the integration of environmental practices over time (Zeng & Jiang, 2023).

In the social domain, a similar pattern emerged. Larger firms were again more likely to endorse fair labour practices and social responsibility, which reflects their capacity to formalize human resource policies and respond to stakeholder expectations (Zvarikova et al., 2024). However, the overall explanatory power of the model was low, echoing concerns in the literature that social ESG indicators are often qualitative and context-dependent, making them difficult to measure or standardize (Habib, 2023). Older firms once more showed less alignment, reinforcing the idea that entrenched practices may create barriers to adopting newer social norms (Fan et al., 2024). Sectoral variation persisted here as well, with firms in service and tourism sectors displaying weaker engagement—possibly due to more volatile labour dynamics and less formalized social governance (Mitra & Bui, 2024).

The governance dimension revealed a different dynamic. While the theoretical literature emphasizes governance as the backbone of ESG, particularly in preventing symbolic compliance or greenwashing (Gillan et al., 2021; Dumitrescu et al., 2022), the empirical findings indicate that governance perception is not significantly shaped by firm size or age. Only sector affiliation showed a modest effect, with service-oriented firms reporting slightly lower levels of legal compliance. This supports the notion that governance functions as a baseline expectation across firm types, less sensitive to demographic variation, and potentially more influenced by universal legal standards than firm-specific characteristics (Chouaibi et al., 2022; Sahin et al., 2023).

Taken together, these findings confirm some theoretical expectations while challenging others. Firm size consistently correlates with stronger ESG alignment, particularly in the environmental and social pillars, affirming the relevance of resource availability and organizational capacity. However, firm age—traditionally associated with experience and reputational capital—appears to limit rather than enhance ESG engagement, perhaps due to resistance to change or legacy constraints. Sector continues to play a contextual role, influencing both environmental and governance perceptions based on the materiality of ESG issues within specific industries.

These results underscore the importance of developing differentiated ESG support mechanisms. Uniform regulatory frameworks may not adequately reflect the varied capacities and incentives across SMEs. Instead, targeted tools—such as simplified reporting templates, sector-specific guidance, and capacity-building programs—could help bridge ESG gaps more effectively (Tsang et al., 2023; Yoo et al., 2024). Furthermore, the limited explanatory power of demographic variables signals the need to explore other determinants of ESG behavior, including leadership values, stakeholder pressures, and institutional environments. Understanding these softer, non-structural drivers may offer a more nuanced picture

of how and why SMEs choose to engage with the ESG agenda.

CONCLUSION

This study set out to investigate how firmographic characteristics—specifically firm size, sector affiliation, and duration of operation—affect the perception and adoption of ESG (Environmental, Social, and Governance) principles among SMEs in the Visegrad Four countries. While the empirical findings partially supported theoretical expectations, they also revealed important nuances. All three demographic variables emerged as statistically significant predictors of ESG perception; however, their overall explanatory power was limited. Firm size exhibited the strongest alignment with ESG engagement, particularly in environmental and social dimensions, indicating that access to resources and internal organizational capacity remain critical facilitators of sustainability practices. In contrast, firm age demonstrated an inverse relationship with ESG alignment, suggesting that institutional inertia may constrain adaptation to emerging sustainability norms. Sector affiliation shaped environmental and governance perceptions, further underscoring the contextual sensitivity of ESG engagement.

From a theoretical perspective, the study contributes to the ongoing debate about the determinants of sustainability orientation in SMEs by demonstrating that structural firmographic variables, while relevant, explain only part of the ESG adoption process. This supports the view that ESG behaviour is embedded within a broader institutional and behavioural context rather than being driven solely by size or sectoral features. The findings expand existing theories of organizational adaptation and resource-based perspectives by highlighting that smaller firms, despite resource constraints, may compensate through agility, innovation, and relational capital. Moreover, the observed inverse relationship between firm age and ESG alignment enriches institutional theory by illustrating how organizational path dependency and cultural rigidity can impede sustainability transitions.

In practical terms, these findings highlight the inadequacy of one-size-fits-all regulatory approaches and emphasize the need for differentiated ESG support mechanisms tailored to the unique capacities and sectoral contexts of SMEs. Simplified disclosure tools, sector-specific guidelines, and targeted ESG education initiatives may be more effective in fostering inclusive sustainability transi-

ons. Policymakers should therefore design ESG frameworks that account for heterogeneity among firms—encouraging gradual adoption pathways and proportional reporting requirements. Business associations and chambers of commerce could play a facilitative role by offering training, benchmarking platforms, and peer-learning opportunities. Additionally, the relatively weak influence of firmographics points to the relevance of non-structural factors, such as leadership orientation, stakeholder engagement, and institutional pressures, in shaping ESG adoption pathways among SMEs. This implies that managerial awareness programs and strategic communication of ESG benefits could substantially accelerate engagement, even among smaller or resource-limited enterprises.

Despite offering valuable insights, this study is not without limitations. First, the analysis was confined to SMEs within the Visegrad Four region, limiting the generalizability of the findings to other geographic or institutional contexts. Second, the reliance on self-reported data introduces the potential for social desirability bias, particularly in responses related to ESG perception. Third, the cross-sectional design restricts the ability to infer causal relationships or observe changes in ESG engagement over time. Additionally, the study employed a quantitative approach focused on firmographics, without incorporating qualitative dimensions such as managerial values or internal organizational culture, which may also significantly affect ESG behaviour.

To build on these findings, future research should adopt a more holistic approach by integrating qualitative methods—such as case studies or interviews—that can capture the subjective motivations and internal dynamics influencing ESG adoption. Longitudinal studies could offer further insight into how ESG engagement evolves over time in response to regulatory changes or market pressures. Expanding the scope beyond the V4 region to include other EU and non-EU countries would also enhance the external validity of the results. Furthermore, examining the interaction between firmographics and softer variables such as leadership style, institutional logics, or stakeholder salience could provide a more comprehensive understanding of ESG behaviour in SMEs. Finally, future research might explore the role of digital transformation, innovation capacity, and inter-organizational networks in enhancing ESG performance across different sectors.

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