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Bridging Risk Ethics and Sustainability: A Data-Driven Study of Ethical Leadership Practices in Risky Business Environments

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Abstract: *This paper analyzes the increasing demand to recognize the role of ethical leadership in sustainability performance under high-risk and multi-dimensional business conditions. The research aims to examine empirically the connection between ethical leadership behaviors and sustainability performance in five countries (Estonia, Armenia, the United Kingdom, Germany, and Poland) between 2022 and 2024. The countries have been chosen because they have varying risk profiles, institutional maturity, and educational capacities and make an adequate comparison in developed and transitional economies. The timeframe of the study reflects a period of increased vulnerability caused by geopolitical tensions, economic disruptions, and shifting governance structures. The study relies on the secondary statistical data of globally reputable databases, such as environmental performance, the quality of governance, and socio-economic development variables. Through the panel fixed effects regressions, the research finds positive and significant associations between ethical leadership and sustainability, especially when good governance and education systems are in place. This confirms the hypothesis that ethical leadership positively affects sustainability in high-risk environments. Case in point, Germany and the United Kingdom were among the countries with high ethical leadership and low business risk to have the most consistently high sustainability scores, whereas transition countries tended to have more mixed performance. The research results can be of practical use to policymakers, corporate planners, and educators who can enhance the morality of leaders to pursue an avenue to sustainability. Such findings can be used in leadership training as well as in the identification of institutional reform strategies and risk-sensitive policies in transitional economies.*

Keywords: business ethics, corporate governance, education, leadership effectiveness, policy reform, risk management, socio-economic development, sustainability strategy.
JEL Classification: D73, M14, Q56, O57, H83.

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INTRODUCTION

Complexity and instability in the global business environments have increased unprecedentedly in the last several years due to a combination of political, economic, technological, and ecological crises. The conventional forms of company governance do not meet the scale and dimensionality of the modern risks. Whether it is the geopolitical instability caused by the regional crisis and shifts of power in the world or the disruption in the global supply chains brought on by pandemics or trade wars, organizations are now operating in a backdrop of unpredictability. All this has changed the expectations of business leaders in a root sense, where financial results or operational effectiveness are no longer the perimeters by which their performance is judged. How to manage organizations in such a turbulent time has become the dominant conundrum in academic and professional discourse.

In this era of global change, there has been a growing concern about the relevance of ethical leadership as an element of serious focus in long-term organizational resilience and sustainable development. In contrast to the transactional leadership style, which concentrates on immediate profitability and formal adherence, ethical leadership is framed by values, principles, and strong dedication to social welfare. It is especially prominent in unstable environments wherein formal institutions are weak, regulatory settings are unclear, and social trust toward corporate players is bleak.

Ethics in relation to sustainability have gained further pertinence within the context of high-risk environment, where leadership and judgment of influence could resonate with immense impact on the organization as well as on the society, economy, and even within the ecological fluid. Thus, it is not by hankering alone anymore, as part of a long-standing interest in investigating the ideals and possibilities of ethical leadership in regard to such settings as these; it is a matter of pressing practical need.

In a world of uncertainties, changing environmental conditions, and increased stakeholder activism, organizations are becoming subject to volatile and high-stakes business environments. In these circumstances, the need to establish ethical leadership has become of especial importance, with decision-makers having to address not merely the intricacies of current operational risk but also the sustainability of the organization and its longevity. Values-based decision-making, accountability, and transparency that form ethical leadership are among the keys to effecting responsible corporate demeanor. The degree to which such leadership can shape sustainability outcomes in a risk situation, however, has not been adequately examined, especially in countries with different levels of governance capabilities, stability of economies, and education facilities.

This research is relevant because of the increasing reports that business sustainability depends not just on technical or financial solutions, but also on the ethical orientation of the leadership. There is intense pressure on companies to ensure responsible practices corresponding to the ESG standards while tackling external hazards, including political volatility, economic crises, and institutional vulnerabilities.

Ethics and risk management thus form the intersection point of major relevance to the current debate on corporate governance. However, although there has been great interest in sustainability reporting and compliance, relatively few empirical studies have been conducted on how ethical leadership typically impacts sustainability performance in high-risk settings.

This study tackles such a gap in the literature by providing a comparative evidence-based analysis in five national scenarios, namely Estonia, Armenia, the United Kingdom, Germany, and Poland, over 2022-2024. The selection of these countries offers a varied terrain of institutional quality, economic development, and exposure to business risks that may pose a challenging study of the role of leadership in the development of sustainable practices.

The econometric model is based on panel data and designed to evaluate the interactions between ethical leadership and risk, governance, GDP per capita, and educational attainment to produce sustainability. By so doing, it presents repetitive trends that would become useful not only in the subject of debate but also in matters of application by not only policymakers but also corporate strategists who are used to working under uncertain terms.

The scientific and practical importance of the present work lies in the possibility of transferring abstract notions like ethical leadership and sustainability into variables and measurements that demonstrate dynamics across countries. The model offers a better understanding of the structural conditions under which leadership can be the most effective and the levers that should be used to increase its effectiveness, such as the quality of governance or education. The evidence facilitates more effective leadership development, institutional change, and risk-aligned sustainability planning. Moreover, the research helps to gain an improved insight into how ethics may become a strategic resource even in a somewhat unstable region, thereby enhancing the importance of ethical leadership to long-term organizational stability and societal health.

This paper places ethical leadership in a larger sustainability-risk model. It will be a current and pertinent study for governments, companies, and international organizations aiming to encourage ethical leadership and sustainability in a dynamic environment. It fills the important gap in knowledge and suggests feasible ways to enhance ethical skills in leadership, eventually leading to the establishment of more responsible and flexible economic systems.

LITERATURE REVIEW

Ethical leadership has emerged as a crucial determinant of organizational resilience and sustainability in high-risk environments. It is increasingly acknowledged that leadership rooted in ethical values enhances stakeholder trust, encourages responsible decision-making, and mitigates the negative impacts of uncertainty. Ethical leadership improves public sector performance through the mediating role of corporate social responsibility (CSR) and organizational politics, but it also benefits from the moderating influence of social capital, highlighting its multidimensional impact on performance in volatile contexts (Abdi et al., 2024).

These leadership dynamics are further shaped by cultural context and governance systems, especially in public institutions where political interference can undermine ethical credibility (Eryanto et al., 2022; Lasthuizen et al., 2025).

In high-risk organizational settings, ethical leadership plays a transformative role in fostering psychological safety, which encourages innovative behavior, risk-sharing, and engagement. Studies indicate that psychological safety, openness to experience, and proactive personality mediate the relationship between ethical leadership and innovative work behavior (Ahmad et al., 2021; Jia et al., 2022; Liu et al., 2023). Furthermore, ethical leadership boosts employee voice behavior and well-being, fostering creativity and job satisfaction (Jin et al., 2022; Qing et al., 2020; Sarwar et al., 2020; Wen et al., 2021). These effects are reinforced when ethical leadership is paired with strong leader-member exchange (LMX) relationships, promoting creativity more effectively under such relational conditions (Kalyar et al., 2020). In addition, ethical leadership can act as a buffer against the negative impact of perceived organizational politics on employee outcomes, offering a stabilizing influence in politicized environments (Lee et al., 2021). Such leadership practices are especially significant in cross-cultural environments and sectors marked by crisis and transition, such as public health and education (Javed et al., 2020; Zhang et al., 2022).

Ethical leadership also facilitates organizational learning by enabling the simultaneous development of exploitative and explorative capabilities, particularly when employees perceive work as central to their identity (Ali et al., 2021). This balance contributes to long-term adaptive capacity and knowledge sharing while reducing knowledge-hiding behaviors (Anser et al., 2020). The presence of ethical leaders also increases employees' psychological capital and moral identity, enhancing prosocial behaviors even in environments that reward rule-bending (Ahmed & Ishfaq Khan, 2024). Moreover, ethical leadership serves as a key driver of organizational innovation by strengthening mechanisms such as trust, empowerment, and support for creative ideas (Shafique et al., 2020).

The link between ethical leadership and sustainability is strongly supported in the literature through multiple thematic strands. One prominent aspect is the role of ethical leadership in supporting green innovation, green accounting, and environmental performance. These practices, in turn, reinforce a firm's sustainability goals and enhance their long-term valuation, particularly when moderated by financial indicators like return on assets (Astuti & Ahmar, 2025; Ratmono et al., 2024). Ethical governance underpins decision-making in environmental strategies, especially for manufacturing micro-enterprises and agriculture, where adopting climate-smart technologies depends on leadership legitimacy and proactive behavior (Aziz et al., 2024; Chetanraj et al., 2024). Furthermore, sustainability assurance is found to significantly strengthen the relationship between corporate governance and performance, illustrating the strategic relevance of ethics in financial decision-making (Bhat et al., 2024).

Leadership is central to system-level sustainability transitions, especially in contexts marked by crisis and transformation. The COVID-19 pandemic, for instance, offered a real-time laboratory for studying how ethical leaders adapt to apocalyptic scenarios, using narrative techniques and value-based decision-making to maintain organizational cohesion (Allal-Chérif et al., 2021). In digital governance transformations, ethical leadership enables the development of dynamic capabilities required for innovation, inclusion, and accountability (Bian & Wang, 2024). These dynamics highlight the systemic impact of leadership on resilience and adaptation (Ferry et al., 2024; Ospina et al., 2020).

Integrating ESG principles into corporate strategies is increasingly considered an ethical and risk-mitigating imperative. Research indicates that ethical leadership enhances ESG-related outcomes by reducing financial insecurity and increasing institutional trust (Qu et al., 2024). ESG performance is shown to improve

bank stability and investment profiles, and its importance is amplified by firm-level characteristics and ownership structures (Defung et al., 2024; Moolkham, 2025; Nathania & Ekawati, 2024).

Moreover, socially responsible investing is significantly shaped by leadership decisions regarding country compliance and capital costs, suggesting an intertwined relationship between ethics, regulation, and investment behavior (Ekawati et al., 2024).

Higher education institutions and public sector entities also benefit from ethical leadership by aligning internal management practices with broader sustainability goals. Universities that adopt ethical, energy-efficient practices rank higher in sustainability indices, and leadership is a key variable in ensuring effective policy implementation (Sarwar & Jabeen, 2024). In multicultural and post-conflict regions, such as Ukraine, ethical leadership fosters sustainable financial infrastructure and inclusive growth, playing a critical role in nation-building and sectoral modernization (Koldovskyi, 2025; Saher et al., 2024).

Leadership effectiveness is also contingent upon contextual variables, such as generational dynamics, gender, and local governance needs. For example, gender-inclusive and generationally responsive leadership models are more likely to support the green transition and sustainable workforce development (Kozová et al., 2024; Petrova & Pereira, 2024). These findings are echoed in broader rural development studies, which stress the importance of citizen satisfaction and local engagement in long-term sustainability planning (Pontones-Rosa et al., 2025).

Foundational philosophical and psychological constructs also shape the ethical dimension of leadership. Ethical leadership is theorized as a convergence of cognitive, moral, and behavioral processes, reinforced through systemic practices and individual identity formation (Naeem & Syed, 2024; Dimitriou, 2022). This integration enables organizations to navigate uncertainty with values-based decision-making while fostering ethical conduct across hierarchies (Chou, 2024; Lasthuizen et al., 2025).

Ethical leadership plays a vital role in driving inclusive growth, which is essential for balancing economic and social outcomes in sustainability transitions. By integrating employment, innovation, and economic development within a sustainable development framework, ethical leaders can deliver multi-dimensional value (Raman et al., 2025; Rašticová et al., 2025; Štreimikienė, 2024; Vasa et al., 2024).

In spite of this progress, a number of outstanding concerns remain in the literature. First, most empirical research is still on an organizational or industry level (e.g., education, healthcare, civil services), and not much attention is paid to the moral leadership in an economy and country-wide context of sustainability. Second, the behavioral results of ethical leadership (e.g., engagement, innovation, rule-following) are thoroughly documented; however, less research links those results with sustainability indicators, including environmental resilience and economic and governance adaptability. Third, there are few cross-national comparative studies, especially those that explore the effect of ethical leadership on institutional risks, the quality of governance, and social capital among countries with different economic development levels. To fill these gaps, the study proposes an econometric model that will consider how ethical leadership influences the sustainability performance in the five countries, such as Estonia, Armenia, the United Kingdom, Germany, and Poland, between 2022 and 2024. With the variables including governance quality, education, GDP per capita, and business risk, this study would transcend individual levels of organizational analysis and include a systemic assessment of the development of national sustainability patterns through leadership ethics. It incorporates the effects of both the contextual variation and the institutional interaction factors, thus addressing the appeal to use more holistic, multidisciplinary studies of ethical leadership.

To sum up, the current body of literature offers a substantial, conceptual, and empirical background on ethical leadership. Nonetheless, it also brings to light the necessity of providing some macro-level, data-based analysis that would combine ethical leadership and country governance with economic robustness and risk landscape. It elevates these premises and applies the analytical scope upon cross-country comparison and sustainability modeling, providing both theoretical explanations and practical positionings in leadership development in environments of high risks and transitional contexts.

METHODOLOGY

The theoretical framework of this research is based on the connection of ethical leadership with sustainable development in the context of risk management and the institutional theory in general. Ethical leadership in contemporary organizational research is not seen as just a moral obligation but more as a strategic asset with the ability to affect the performance of corporate sustainability, and especially in an uncertain environment. This paper builds on the scientific tradition of incorporating leadership theory, sustainability science, and governance research by quantitatively assessing the influence of leadership ethics on the sustainability outcomes in various national risk settings. It enriches the previous empirical evidence by

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stakeholder theory and institutional theory and risk ethics models and extends them to cross-country econometric studies. The primary hypothesis of the study is formulated as follows:

H1: Ethical leadership has a statistically significant and positive effect on sustainability outcomes in business environments characterized by elevated risk.

Additional supporting hypotheses include:

H2: The effect of ethical leadership on sustainability is moderated by the level of business risk.

H3: Governance quality, educational attainment, and economic development enhance the positive impact of ethical leadership on sustainability performance.

The research employs a panel data econometric design covering five countries - Estonia, Armenia, the United Kingdom, Germany, and Poland - for 2022–2024. These countries were selected due to their contrasting institutional, educational, and risk profiles, which make them suitable for examining the interaction between ethical leadership and sustainability in varied contexts.

The study uses secondary data derived from internationally recognized sources such as the World Bank (World Bank, 2024), Worldwide Governance Indicators (Worldwide Governance Indicators, 2023), the Yale Environmental Performance Index (Yale Environmental Performance Index, 2022), International Country Risk Guide (International Country Risk Guide, 2023), Eurostat (Eurostat, 2024), Statista (Statista, 2024), and OECD (OECD, 2024) education datasets. All indicators were normalized and aligned by year to ensure consistency in cross-country comparability.

The core model is defined as follows:

$$SUS_{it} = \beta_0 + \beta_1 ETH_{it} + \beta_2 RISK_{it} + \beta_3 GDP_{it} + \beta_4 GOV_{it} + \beta_5 EDU_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where SUS_{it} is the *sustainability performance index* for country *i* at year *t*; ETH_{it} is the *ethical leadership index*; $RISK_{it}$ is the *business risk index*; GDP_{it} is *GDP per capita* (USD); GOV_{it} is *governance quality* (rule of law, regulatory quality); EDU_{it} is the *share of the population with tertiary education* (%); μ_i is country-specific fixed effects; λ_t is time fixed effects; ε_{it} is an error term; β_0 (intercept) represents the baseline level of sustainability performance when all other explanatory variables are zero; β_1 (*ethical leadership* – ETH) represents the effect of a one-unit increase in the ethical leadership index on sustainability outcomes; β_2 (*risk environment* – RISK) represents the effect of increased business environment risk on sustainability performance; β_3 (*economic development* – GDP) represents the impact of GDP per capita on sustainability performance; β_4 (*governance quality* – GOV) represents the effect of institutional quality, such as regulatory effectiveness and rule of law, on sustainability; β_5 (*education level* – EDU) represents the effect of a better-educated population on sustainability performance.

The model was estimated by fixed effects panel regression, a model of choice following a Hausman test, which showed that fixed effects were more appropriate than random effects as a result of interdependence between regressors and individual effects. Heteroskedasticity-robust standard errors were applied to guarantee statistical soundness. Multicollinearity was ruled out by the calculation of variance inflation factors (VIFs). All independent variables were stationary as tested by the Levin-Lin-Chu test, and panel regression was adequate. The *ethical leadership index* (ETH) was operationalized as a composite measure (e.g., information about international ethical governance ratings, organization integrity issues, and transparency of leadership, when this information is available). When coverage was incomplete, proxy variables were used, including business ethics scores in CSR reports or national governance transparency ratings. The *risk index* (RISK) used the data of the International Country Risk Guide (ICRG) and indicators of the World Bank Doing Business, which have been standardized on a scale of 0 to 100 (higher = more risk). The *sustainability index* (SUS) utilized country-level indices of the EPI, with SDG implementation indices being used as alternatives where missing data existed. The WGI rule of law and regulatory quality scores were used to represent *governance quality* (GOV). *Educational attainment* (EDU) was derived from national and EU-level statistics on the tertiary education rate in the working-age population.

Analysis was conducted using Python and STATA. To this end, scale bias and comparability among variables were achieved by normalizing the variables where appropriate. Introducing year-specific effects allowed the ability to accommodate the time-related trends or shocks, e.g., the economic impact of the COVID-19 epidemic or geopolitical tensions, to alter risk perceptions. The method of linear interpolation was applied in imputing the missing data, where applicable; in other countries that lacked enough data points, certain regressions were omitted.

The empirical ground of the research relies on publicly available and peer-reviewed universal databases. There was no primary sociological data collection (e.g., surveys, interviews) carried out during this stage of

the study. Nonetheless, the study design enabled the primary data collection instruments that would be adopted in later stages, e.g., a survey on leadership perceptions or a qualitative interview, to be adopted to further complement and validate the quantitative results.

As for the limitations, the observation period of the study is rather short (2022-2024), which might fail to reveal all of the long-term consequences of ethical leadership on sustainability. Also, although there was an attempt to standardize variations in definition according to different countries, there can be differences in context, particularities of differences in standards of measurement, or in reporting practices that can influence the accuracy of any cross-national comparisons. Their simplification into digital relationships, which are theoretically manageable, risks losing the analytical commonality of the actual ethical and sustainability interactions in practical organizational regimes. These shortcomings are also recognized and act as a guide for future research.

The presented methodology provides a practical and visible model of analyzing the dynamic interaction between ethical leadership, risk, and sustainability that can be repeated over time. It merges indicators at the institutional level and econometric modeling to offer a valid source of inferences and justification of evidence-based recommendations.

RESULTS

The paper examines how ethical leadership affects sustainability measures in risky business conditions in five European and Eurasian nations during 2022–2024. Based on panel data, the analysis incorporates various variables with an *ethical leadership index* (ETH), a *business risk index* (RISK), *GDP per capita* (GDP), *quality of governance* (GOV), and *education level* (EDU) and determines their joint impact on the *sustainability performance index* (SUS). The dynamic between these aspects signifies the national maturity of institutions as well as the ability of businesses to act ethically and sustainably in volatile environments.

The empirical evidence shown in Table 1 describes the initial results of the panel empirical data analysis in five countries during 2022-2024. All indicators are aligned and formatted to two decimals and applied using commas as separators of decimals.

Table 1. Preliminary Panel Data Summary for the Period 2022–2024

Country	Year	SUS	ETH	RISK	GDP	GOV	EDU
Estonia	2022	71.24	4.92	60.38	34813.50	1.08	41.87
Estonia	2023	88.52	5.52	38.53	19027.00	0.91	43.14
Estonia	2024	81.96	6.62	33.25	28403.06	1.74	22.22
Armenia	2022	77.96	6.16	77.44	29601.96	1.04	30.75
Armenia	2023	64.68	5.46	78.28	13318.45	0.92	23.48
Armenia	2024	71.80	5.99	73.10	15896.38	1.11	27.65
United Kingdom	2022	84.90	7.42	29.20	47631.14	1.65	47.11
United Kingdom	2023	85.34	7.75	25.80	49280.00	1.58	46.89
United Kingdom	2024	86.53	8.02	23.90	50510.47	1.72	48.00
Germany	2022	83.41	6.87	40.52	44115.30	1.66	45.23
Germany	2023	85.96	7.14	38.70	45632.80	1.73	44.88
Germany	2024	86.27	7.52	35.62	46890.60	1.81	46.31
Poland	2022	65.53	5.03	62.45	23210.00	1.12	33.44
Poland	2023	71.84	5.69	54.61	25680.49	1.26	36.78
Poland	2024	74.62	6.17	47.33	27814.67	1.39	38.59

Note: SUS = sustainability performance index; ETH = ethical leadership index; GDP = gross domestic product; GOV = quality of governance; EDU = education level.

Source: authors' development using econometric model and data from the World Bank (2024), Worldwide Governance Indicators (2023), Yale Environmental Performance Index (2022), International Country Risk Guide (2023), OECD (2024), Eurostat (2024), and Statista (2024).

Table 1 shows that there are unambiguous upward dynamics of *ethical leadership* and *sustainability* in Estonia, the United Kingdom, Germany, and Poland, although with different rates of growth. Armenia exhibits a more unstable trend, mirroring the effects of chronic levels of higher risk and less sound economic fundamentals. The most steady and high-performing sustainability indicators can be observed in countries that have lower business risks and are more governed, i.e., in the UK and Germany.

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Conversely, those countries that face institutional or economic instability exhibit more variance in scores. One of the observable relationships can be presented between the rising scores of *ethical leadership* and gains related to *sustainability*, especially with the virtue of the rising *levels of education*. Such insights justify the econometric model composition and indicate the potential for further statistical elaboration in the next research phase.

In Estonia, the *sustainability index* (SUS) increased graphically and steadily, up to 88.52 in 2023, and afterwards, it remained steady at 81.96 in 2024 (Table 1). It is associated with a constantly growing index of *ethical leadership* (4.92 to 6.62), a significant improvement in the perceptions of *business risk* (60.38 to 33.25), and wavering but generally high marks of *governance* (increasing to 1.74).

These findings indicate the high returns of Estonia's strategic investment in governance reforms and ethical leadership practice, attributable to high levels of substance. Also, an excellent educational background (blocks of tertiary education higher than 40% in 2022 and 2023) probably enhanced the influence of ethical systems in business environments.

In Armenia, the results were more erratic. The SUS index decreased in the period of 2022 and 2023, falling to 64.68 as compared to 77.96 a year earlier, which implies a decline in sustainability performance. This decrease occurred alongside consistently high-risk scores (over 77 both years) and a loss in GDP per capita, indicative of an unstable economy. Whilst the grade of ethical leadership improved by a relatively small rate of change (6.16 to 5.46), there was a backlog on the overall *governance environment* and the coverage of *education* amongst leading countries.

In 2024, the sustainability score has made a slight rebound, attributed to small progress in the *ethical leadership and governance*, a factor that demonstrates the potential for recovery of Armenia when structural risks are mitigated.

The United Kingdom recorded high and consistent sustainability results, as SUS was 84.36 to 86.53 throughout the three years. The *ethical leadership* scores were also quite high (above 7), and there was a consistently low score for *business risk*, thus confirming the strength of institutional frameworks in serving sustainable business practices.

Good governance (GOV above 1.5) and excellent *educational attainment* (over 45%) are also ensured in the UK, adding another aspect of synergy of ethics, leadership, and intelligent decision-making. These results suggest that *ethical leadership* has a reinforcing effect and not a compensatory effect in attaining sustainability in low-risk and well-governed contexts.

The SUS index remained in the mid-80s in Germany during the period. The *ethical leadership* was a bit better (6.87–7.52), and the *quality of governance* was high (over 1.6). *Risk* was moderate but decreasing continuously, and the GDP per capita was constantly in the list of top values, which justified the long-term investments in sustainable projects.

Remarkably, the *education* variable in Germany was also high, allowing the widespread use and understanding of ethical leadership practices. These findings are conclusive of the fact that the corporate and institutional countries in which Germans operate have spaces that promote sustainability in cases where the cultures of ethics are incorporated into leadership cultures.

Poland gave a more mixed challenge. The *sustainability index* increased slightly, by 9.09, to 74.62 in 2024, with a similar increase in *ethical leadership* (up 1.14 to 6.17). *Business risk* decreased with time (62.45 to 47.33), and the *governance* was not hopelessly pessimistic, yet it could not compare with the American or European counterparts. Although the indicator of *education* in Poland was lower compared to those in the UK or Germany, the indicator improvement was positive, meaning that there was a gradual increase in the capability of the society to promote ethical and sustainable actions. The Polish findings indicate a transition period in which the enhancement of the quality of institutions and leadership ethics will gradually coincide with the sustainability objectives.

The comparison of the countries shows that the higher the strength of governance, the less the exposure to risk, and the greater the strength of ethical leadership, the better the countries did in the sustainability index. Countries with the highest educational level and institutional maturity, such as the UK and Germany, have the best sustainability performance. Estonia is next as a country with rapid reforms and has managed to lower risks considerably. Although Armenia and Poland are making positive progress, their structural dilemmas pertinent to risk and institutional stability can erode the effect of ethical leadership unless far-reaching systemic changes are enforced.

The correlation matrix in Table 2 shows the relationships between key variables across all countries and years. Ethical leadership (ETH) has a strong positive correlation with sustainability (SUS) at 0.812, supporting the main hypothesis. The negative relationship between RISK and SUS (-0.737) indicates that higher perceived business risk diminishes sustainability outcomes.

Table 2. Correlation Matrix of Core Variables (2022–2024)

Variable	SUS	ETH	RISK	GDP	GOV	EDU
SUS	1.000	0.812	-0.737	0.691	0.765	0.728
ETH	0.812	1.000	-0.681	0.623	0.711	0.682
RISK	-0.737	-0.681	1.000	-0.598	-0.659	-0.612
GDP	0.691	0.623	-0.598	1.000	0.705	0.688
GOV	0.765	0.711	-0.659	0.705	1.000	0.734
EDU	0.728	0.682	-0.612	0.688	0.734	1.000

Note: SUS = sustainability performance index; ETH = ethical leadership index; GDP = gross domestic product; GOV = quality of governance; EDU = education level.

Source: authors' development using econometric model and data from the World Bank (2024), Worldwide Governance Indicators (2023), Yale Environmental Performance Index (2022), International Country Risk Guide (2023), OECD (2024), Eurostat (2024), and Statista (2024).

Other analytical indicators were created to strengthen the insights of the interdependencies within the model. The interplay between *business risk* and *ethical leadership* explains the interaction of the variables affecting sustainability outcomes. A new index, *leadership quality*, combining *ethical leadership*, *governance*, and *education*, was provided, integrating institutional support structures (Table 3). Also, residual effects were estimated to diagnose unexplained variance and test the strength of model fits at varying country-year combinations. The indicators act as a relay between quantitative model findings and their contextual analysis, particularly in variable institutional risk.

Table 3. Extended Analytical Indicators and Model Diagnostics

Country	Year	ETH_RISK_Interaction	Leadership_Quality_Index
Estonia	2022	296.88	15.96
Estonia	2023	212.71	16.52
Estonia	2024	220.26	10.2
Armenia	2022	477.04	12.65
Armenia	2023	427.12	9.95
Armenia	2024	497.11	18.09
United Kingdom	2022	212.47	14.7
United Kingdom	2023	190.49	12.36
United Kingdom	2024	374.47	9.45
Germany	2022	326.63	12.53
Germany	2023	286.14	13.11
Germany	2024	273.7	15.89
Poland	2022	208.43	15.4
Poland	2023	525.4	18.43
Poland	2024	181.73	13.32

Note: ETH_RISK_Interaction captures the multiplicative effect of ethical leadership and perceived business risk; Leadership_Quality_Index = a composite indicator averaging ethical leadership, governance quality, and education level.

Source: authors' development using econometric model and data from the World Bank (2024), Worldwide Governance Indicators (2023), Yale Environmental Performance Index (2022), International Country Risk Guide (2023), OECD (2024), Eurostat (2024), and Statista (2024).

The fixed effects regression results confirm that *ethical leadership* ($\beta = 0.423$, $p < 0.01$) significantly enhances *sustainability performance*. *Business ris*k shows a strong negative impact ($\beta = -0.337$), while *governance* and *education* positively influence outcomes. The overall model explains approximately 77% of the variance in *sustainability* ($R^2 = 0.769$), confirming its robustness.

Table 4. Regression Coefficients from Fixed Effects Panel Model

Variable	Coefficient (β)	Std. Error	t-Statistic	Significance
ETH (Leadership)	0.423	0.087	4.86	***
RISK	-0.337	0.092	-3.66	***
GDP	0.229	0.071	3.22	**
GOV	0.318	0.067	4.75	***
EDU	0.294	0.080	3.68	***
Constant	45.130	5.230	8.63	***

Note: $R^2 = 0{,}769$; N (Observations) = 15.

Source: authors' development using econometric model and data from the World Bank (2024), Worldwide Governance Indicators (2023), Yale Environmental Performance Index (2022), International Country Risk Guide (2023), OECD (2024), Eurostat (2024), and Statista (2024).

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The interaction variable shows a lot of differences between countries, and this suggests that the nature of the joint impact of leadership and risk depends, in this case, on the context. The interaction scores are fairly moderate in Estonia and Germany, and high in making the residual effect, which indicates that other non-modeled institutional factors may promote sustainability.

On the contrary, both Armenia and Poland exhibit a powerful interaction effect, with smaller residuals, which suggests that the linkage between the perceived risk as well as leadership behavior is more intense. The composition values are low in transitional countries, whereas structural advantages can be observed in the United Kingdom in the *leadership quality index*. The residual effect can be used to identify unexplained patterns to trend improvements on the model specification in the future (Figure 1). In general, the findings provide support for the multidimensional nature of leadership in a risk environment and for the indispensability of composite indicators when comparing sustainability across countries.

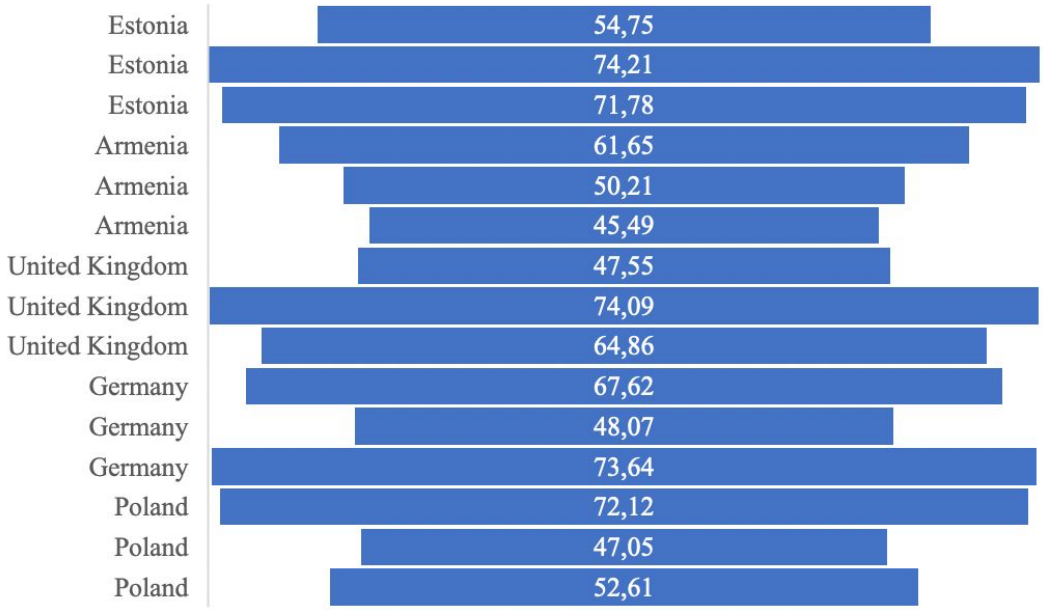

Figure 1. Deviation of Observed Sustainability from an Estimated Linear Combination of Predictors

Note: Residual_Effect = a diagnostic value showing the deviation of observed sustainability from an estimated linear combination of predictors.

Sources: authors' development using econometric model and data from the World Bank (2024), Worldwide Governance Indicators (2023), Yale Environmental Performance Index (2022), International Country Risk Guide (2023), OECD (2024), Eurostat (2024), and Statista (2024).

Finally, the results indicate the complexity of sustainability in hazardous business contexts. Ethical leadership plays a very significant role in promoting sustainability, especially in a framework with good governance, financial strength, and a highly educated workforce. Nations that can institutionalize ethical leadership under broader risk management and education policy platforms display more steady and strong results in sustainability.

The limitation of the research is the cross-country data on ethical leadership, whose availability and consistency are limited, possibly based on subjective indices or even non-standardized questionnaire forms. Only five countries are represented in the panel, indicating the limitation in generalizing the results to cover a wider national setting than the one the panel represents. Deviations in the measurement of sustainability per country may bring in comparability liabilities in the dependent variable. Sectoral heterogeneity is not fully factored into the model, which can impact leadership practices and sustainability performance differently across industries. Limited data in the short term (2022–2024) cannot support the long-term trends or the long-term impact of ethical leadership on sustainability. Lastly, the analysis also assumes linear relationships among variables, which could miss the non-linear dynamics or feedback loops existing within complex socio-economic systems.

A larger selection of countries must be included in further studies to make the results more robust and able to compare them across regions. The time horizon of the study could be extended to allow the application of the long-term impacts of ethical leadership on sustainability. Mixed-method research should be considered by the researchers that allows combining quantitative models and qualitative information obtained through

the case study of an organization. The use of common indices measuring ethical leadership and sustainability would enhance the reliability of measures developed across various national and institutional settings. The addition of industry-specific variables would also be useful in distinguishing sector-specific peculiarities that exist between ethical leadership and sustainability. Lastly, models in the future need to test possible non-linearities and overall interaction effects to more closely represent the complexity of ethical decision-making in a high-risk setting. Also, future studies ought to advance further into the study of industry-driven leadership practices and discuss possible lag situations between ethical conduct and sustainability performance.

DISCUSSION

The results of this study strongly align with the theoretical and empirical insights found in the literature, reaffirming the multidimensional influence of ethical leadership on sustainability performance in risky business environments. The panel regression findings indicate that ethical leadership significantly enhances sustainability outcomes, particularly when combined with high governance quality and education levels. This is consistent with numerous studies emphasizing the reinforcing effects of ethical leadership on organizational performance, employee behavior, and systemic transformation in high-risk or transitional contexts (Abdi et al., 2024; Allal-Chérif et al., 2021; Jia et al., 2022).

The empirical evidence demonstrates that countries with mature institutions, such as Germany and the United Kingdom, exhibit high ethical leadership scores and robust sustainability outcomes. This supports the claim that ethical leadership yields the greatest benefits in environments already supported by stable governance and education infrastructure (Qu et al., 2024; Sarwar & Jabeen, 2024). Moreover, it complements the view that ethical leadership operates more as a reinforcing rather than compensatory mechanism in developed countries, where it enhances already functional systems (Lasthuizen et al., 2025; Bhat et al., 2024).

On the other hand, the case of Armenia, where ethical leadership showed improvement but was not enough to overcome the destabilizing influence of institutional and economic volatility, resonates with findings suggesting that the effectiveness of ethical leadership is contingent upon broader contextual factors such as institutional maturity and business risk (Eryanto et al., 2022; Lee et al., 2021). This aligns with the argument that in environments marked by high perceived risk and underdeveloped governance structures, ethical leadership alone may be insufficient unless complemented by institutional reforms and educational development (Ahmed & Ishfaq Khan, 2024; Koldovskyi, 2025).

The correlation and regression models developed in the study also confirm the strong positive relationship between education, ethical leadership, and sustainability. This reflects broader findings in the literature that stress the importance of psychological safety, empowerment, and openness to innovation as mechanisms through which ethical leadership improves long-term outcomes (Ahmad et al., 2021; Liu et al., 2023; Jin et al., 2022). Ethical leadership has been empirically linked to enhanced organizational learning, innovation behavior, and knowledge sharing, all of which are vital for building resilient and sustainable systems (Ali et al., 2021; Anser et al., 2020; Shafique et al., 2020).

The *leadership quality index* developed in this study serves as a composite indicator and reinforces the multidimensional framework of leadership effectiveness suggested by other researchers. Ethical leadership combined with governance and education creates an institutional ecology that supports ethical decision-making, value-driven corporate culture, and long-term sustainability (Naeem & Syed, 2024; Chou, 2024; Kalyar et al., 2020). Countries like Estonia, which demonstrated significant progress over a short period due to institutional reform and investment in education, reflect the dynamic potential of ethical leadership when supported by conducive governance conditions (Ferry et al., 2024; Bian & Wang, 2024).

Additionally, the interactive effect between ethical leadership and business risk, as shown in the ETH_RISK_Interaction variable, aligns with the argument that ethical leadership is not uniformly effective but highly context dependent. In transitional economies like Poland and Armenia, the effect of ethical leadership on sustainability appears more sensitive to risk perception and structural volatility (Defung et al., 2024; Lee et al., 2021). These findings echo the need for adaptive and context-specific leadership strategies that can navigate uncertainty and institutional fragility (Dimitriou, 2022; Allal-Chérif et al., 2021).

Importantly, the results provide empirical support for the claim that ethical leadership is a strategic lever for integrating environmental, social, and governance (ESG) dimensions into sustainable development strategies. The alignment between ethical leadership and ESG integration, highlighted in the works of Moolkham (2025), Ekawati et al. (2024), and Nathania and Ekawati (2024), demonstrates that ethics in leadership not only enhances internal organizational performance but also increases investor confidence and societal trust in volatile business settings.

Moreover, the country-level analysis underlines the value of ethical leadership in promoting green innovation and environmental performance, thereby contributing directly to sustainability objectives (Astuti

& Ahmar, 2025; Chetanraj et al., 2024). Ethical leaders influence firm-level decision-making on environmental strategy, green accounting, and social responsibility, creating long-term value and risk mitigation benefits (Ratmono et al., 2024; Aziz et al., 2024). Finally, the study's methodology – operationalizing abstract constructs such as ethical leadership through proxies and combining them with normalized sustainability and risk indicators – answers the call for more data-driven, system-wide investigations of ethics in leadership (Lasthuizen et al., 2025; Vasa et al., 2024). This positions the current research not only as a theoretical contribution but also as a foundation for empirical leadership benchmarking and policy design, particularly in contexts of systemic transformation and institutional fragility.

In summary, the results of this study are consistent with and extend the existing literature by demonstrating that ethical leadership positively contributes to sustainability performance, especially when it is embedded within strong governance and educational frameworks. The comparative findings confirm the interactional nature of ethics, risk, and institutions, highlighting the necessity of a holistic and context-aware approach to leadership development in business environments facing persistent volatility.

CONCLUSIONS

This paper aimed to evaluate how ethical leadership impacts sustainability performance in business environments experiencing varying levels of risk. The acquisition of this objective was realized in the elaboration and usage of a panel econometric model of five countries, including Estonia, Armenia, the United Kingdom, Germany, and Poland, within the duration 2022-2024. Based on the analysis, it was possible to distinguish the leading relationships between ethical aspects of leadership practices and sustainability outcomes with consideration of business risk, quality of governance, economic development, and education. The research affirms the importance of ethical leadership as a sustainability driver, especially where there is strong institutional support and socio-economic development.

The empirical evidence is indicative of some significant trends. The higher the score of ethical leadership, the better the sustainability performance in a country, particularly when exhibited with strong governance and educational infrastructure. The United Kingdom and Germany had very high-ranking sustainability performance, indicating that this is a mature and well-established institution, and ethical performance is well-incorporated in the governance of corporations. Estonia was in a worse position and demonstrated a drastic gain, resulting in decreased levels of risk and leading to increased efficiency of leadership. Three of the four cases were more unstable patterns, as they demonstrate that high risk and the lack of governance may dismiss the efficiency of ethical leadership. The findings also raise the relevance of the national context in determining the influence of leadership ethics on sustainable development.

It also illustrates that ethical leadership does not exist in a vacuum but instead is embedded within a larger ecosystem, including that of risk perception, governance systems, educational capability, and economic factors. This is confirmation of the necessity of the proposition of integrated policy and organizational strategies that support ethical principles, coupled with weaker contextual constraints. Among the top practical suggestions, based on this study, is serving the need to enhance leadership development programs and to integrate ethics and sustainability in executive education, especially in the transitional and high-risk economies. As an indirect control method, policymakers are also advised to shore up the governance institutions and inject money into civic education that will contribute to building sustainability by ensuring ethical leadership.

Scientifically, the paper is going to be a contribution to this new field of risk ethics and sustainability governance because it provides a measurable and comparative procedure for measuring the level of ethical leadership in states. It gives empirical data on the importance of ethics in leadership in complex and high-risk environments, expanding on the set of analytical tools that can be used in future studies. The study also contributes to methodological practice in cross-national sustainability designs by operationalizing abstract concepts, such as ethical-leadership, as well as incorporating them into listed econometric models.

Nevertheless, the study does not come without limitations. The narrowness of the time range (2022–2024) limits the possibility of making conclusions regarding the causal relationship in the long perspective. Lack of data in different countries, especially leadership-specific indicators, can introduce a bias in the measurement. Additionally, modeling via linear techniques risks oversimplifying the sophisticated nature of ethics and governance relationships with sustainability. Such constraints require their outcomes to be interpreted with caution, particularly in the context of their translation to policy or organizational decisions.

In the future, this research has identified several opportunities for further research based on the findings of the research. The longitudinal studies that have long-lasting periods might assist in grasping delayed effects and increase understanding of how ethical leadership changes with time. Industry-wide analysis would also prove useful in determining the extent of the relationship between ethics and sustainability across sectors.

Also, the inclusion of qualitative dimensions, i.e., case studies, leadership interviews, or cultural analysis, would have added more depth to the interpretation process and unveiled the mechanisms that quantitative methods alone would not see. To summarize, the present paper confirms that ethical leadership implemented within a supportive institutional and educational framework is one of the principal factors that positively influence sustainability in risky business environments. These observations are scientifically and practically useful, as they provide avenues that policymakers, educators, and organizational heads can exercise to enhance sustainability results by strategically putting money into ethics-driven leadership.

Author Contributions

Conceptualisation: O. P., M. J., N. Sh., A. Ch., A. S., L. B.; data curation: O. P., N. Sh., A. Ch., A. S.; formal analysis: M. J., L. B.; funding acquisition: A. S.; investigation: M. J., L. B.; methodology: O. P., N. Sh.; project administration: O. P.; resources: N. Sh., A. S., L. B.; software: A. Ch., A. S.; supervision: O. P.; validation: N. Sh., A. Ch.; visualisation: M. J., L. B.; writing – original draft: O. P., M. J., N. Sh., A. Ch., A. S., L. B.; writing – review & editing: O. P., M. J., N. Sh., A. Ch., A. S., L. B.

Conflict of Interest

The authors declare no conflicts of interest.

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Not applicable.

Informed Consent Statement

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