JURNAL
Riset Akuntansi dan Keuangan Indonesia
URL : http://journals.ums.ac.id/index.php/reaksi/index

# ESG Resilience Under Geopolitical Turbulence: Digital Infrastructure as a Moderator of Global Risks and Local Political Networks in Indonesia

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**Keywords:**
Environment, Social, and Governance, Geopolitical Risk, Political Connection, ICT Development Index, GMM

**ABSTRACT**
This study examines how digital infrastructure strengthens the ESG resilience of Indonesian firms facing geopolitical risks and political network dynamics. Analyzing 89 IDX-listed companies (2016–2023) using dynamic panel regression reveals three findings. Geopolitical Risk undermines ESG performance, though state-owned enterprises show greater resilience due to resource access, remaining politically vulnerable. Political Connections have no significant effect, indicating a short-term interest focus over sustainability. Digitalization directly enhances ESG performance and moderates the negative impact of geopolitical risk by boosting transparency and signaling. Robustness checks with 2SLS confirm the results. The study highlights digital infrastructure as a vital strategic tool for mitigating geopolitical risk and promoting sustainable corporate practices.

## INTRODUCTION

It has been recognized that the discourse on Environmental, Social, and Governance (ESG) implementation has undergone a doctrinal shift, influencing corporate paradigms, evolving from a secondary evaluation framework to a primary standard for measuring sustainability performance and commitment (J. Li et al. 2024; Alsayegh, et al., 2020). This paradigm shift is driven by the growing interest and role of businesses in upholding sustainable investing as a mainstream issue. The ESG consensus is no longer simply a compliance exercise but a crucial strategic imperative, requiring companies to provide credible reports on ESG performance, as this is a key consideration in investment decision-making (Delgado-Ceballos et al., 2023).

So far, in Indonesia, ESG implementation has experienced rapid development in recent years, even shifting from mere discourse to a strategic obligation. The increasing complexity of external challenges, ranging from economic policy volatility and stakeholder pressure to global political pressure to align with sustainable development goals, has made ESG an existential factor for the sustainability of corporate operations and long-term value creation (Qoyum et al., 2022). However, amidst the urgency of this agenda, Aziz (2022) assessed that government support appears to be lagging. The lack of fiscal incentives, particularly for state-owned enterprises and other corporations, compounds the structural challenges that hinder the acceleration of ESG practices. Yet, in many countries, fiscal policy is a key pillar in encouraging sustainable investment (Miao et al. 2023; Ozili 2024).

Furthermore, another undeniable fact is that the challenges to ESG implementation stem not only from corporations and state institutions themselves, but also from increasingly undeniable external dynamics. This is most evident at the global level, where geopolitical risk is now a critical variable influencing investment decisions and corporate ESG performance (Jiang et al. 2024; Al Amosh and Khatib 2025). Geopolitical volatility, in particular, not only presents significant challenges to macroeconomic stability but also tests the resilience of sustainable investment (Li et al. 2021).

Dislocated ESG portfolios tend to record inconsistent performance amid geopolitical turmoil, a paradox given that ESG practices are supposed to build long-term resilience (Reyad et al., 2024). It is no surprise, then, that this issue has attracted the attention of academics and market participants, who are grappling with the critical question of "how does global political instability continue to erode corporate sustainability commitments, and what mechanisms allow geopolitical risks to shift ESG priorities from long-term strategy to mere pseudo-compliance, potentially?" The urgency of addressing this question becomes even more critical when confronted with conflicting trends. On the one hand, the push for ESG adoption is increasingly unstoppable, driven by investors, policymakers, and global norms, as the framework that has underpinned classical literature (DiMaggio & Powell, 1983).

As discussed previously, the modern business configuration creates difficult choices. On the one hand, there are demands to respond to short-term fluctuations due to geopolitical turbulence and domestic economic policy uncertainty. On the other hand, there is also the imperative to maintain a credible commitment to the sustainability agenda (C. Zhang et al. 2024; O'Brien 2025). This turmoil not only shortens strategic planning horizons but also creates gaps in sustainability governance, where global institutional pressures collide. With operational challenges at the micro level (Bojaj & Aharon, 2024). So, how can companies navigate this dilemma?

Recent studies confirm that external instability does not necessarily require the sacrifice of ESG principles when companies have appropriate governance structures in place. For example, Amosh and Khatib (2025) found that geopolitical risk significantly impacts companies' ethical commitment to ESG performance. This risk triggers institutional changes that alter stakeholder norms and expectations, forcing companies to adopt new strategies to mitigate risks and meet external demands. Ironically, this adaptation process often diverts resources from ESG initiatives, thereby negatively affecting the achievement of sustainability goals.

These dynamics are further complicated when investment dynamics are considered alongside geopolitical risk, as Barman and Mahakud (2025) confirm. Policy uncertainty and geopolitical risk create a risk effect for companies, which tends to

p-ISSN:1411-6510
e-ISSN:2541-6111

delay all forms of investment, including sustainable investment, even though such investments are crucial to the company's future operations. This complication reaches its peak when geopolitical risk interacts with domestic economic policy uncertainty, creating a constellation of mutually reinforcing risks (Özkan et al., 2025). Studies (Baker, Bloom, and Davis 2016; Caldara et al. 2022) explicitly state that government policy volatility and global geopolitical dynamics not only disrupt the investment climate but also create significant distortions in decision-making, including corporate ESG. This claim explains why geopolitical risk is now a focus of attention among the global investment community, as its multidimensional impacts not only reposition the corporate economic landscape but also reconfigure sustainable investment strategies.

This phenomenon is increasingly concerning, particularly in the Indonesian context, where heterogeneity in corporate ownership structures and variations in political access create disparate responses to geopolitical pressures and their impact on ESG performance. Empirical evidence suggests that political connections function as a double-edged sword. On the one hand, they serve as a strategic adaptation mechanism through preferential access to government policies (Faccio et al. 2006), a strategy to mitigate policy uncertainty through embeddedness in bureaucratic networks (Boubakri et al. 2012), and a distortion in the allocation of ESG projects based on patronage networks (Bongermino and Romagnoli 2025). However, this practice is eroding ESG integrity. Suspicions are further heightened by the policy of delaying the implementation of the carbon tax for companies with political ties to policymakers (Dirjen Pajak 2022), a strong indication that the sustainability agenda is not immune to politicization.

So, how do political connections influence ESG commitments in other countries? This can be traced back to a country's political and economic context. For example, in China, political connections actually drive ESG performance, particularly for microenterprises and state-owned enterprises (SOEs) that receive state support (Zhang and Han 2025). However, in Vietnam, companies with foreign connections actually outperform those relying on domestic political networks in ESG transparency (Nguyen-Thi-Hong et al., 2024). Meanwhile, in the UK, a lack of political connections actually undermines ESG resilience amid economic policy uncertainty (Harjoto & Wang, 2024). This means that political connections are not a guarantee of ESG success; they can be a tool, but they can also create patterns of dependency on access to resources. Most worrying is when political connections are used not to improve ESG performance, but to enhance a company's image. However, the question remains: can Indonesia learn from this polarization, or will it remain trapped in the paradox of political connections that actually weaken ESG? One of the fundamental problems with the State-Owned Enterprise (SOE) system is that it acts not only as an economic actor but also as a political vehicle that promotes development agendas and legitimizes power (Wahyu, 2024).

This practice distorts investment allocation, diverting resources to short-term image-building projects at the expense of sustainability (Joni, Natalia, and Leliana 2023; Adi 2022). In this context, digital infrastructure (ICT) has emerged as a critical solution, not only to strengthen ESG governance but also to mitigate the geopolitical risks and politicization inherent in traditional business models. Globally, some academics argue that infrastructure, with real-time analytics, can serve as an ESG savior by reducing dependence on physical supply chains vulnerable to geopolitical turmoil (Zheng et al. 2024; Rastogi & Singh 2023).. However, this potential appears to face unique challenges, particularly in Indonesia, where fragmented regulations and informal political connections (Shimamoto et al. 2017) have transformed digitalization from a solution into a new tool for rent-seeking, with technological infrastructure controlled by political elites.

Nevertheless, the above discussion demonstrates that ICT still offers an opportunity to break the cycle of politicization by creating an ecosystem that encourages multi-stakeholder collaboration and minimizes information asymmetry, a key factor often exploited in political rent-seeking. Furthermore, decentralized governance can neutralize geopolitical weapons by redistributing economic control and strengthening cyber resilience. Can Indonesia leverage ICT as an ESG protector, or will it instead be trapped in

the same polarizing political agenda? Interestingly, several Indonesian companies face a paradoxical institutional landscape: on the one hand, public companies adopt multilevel policies to navigate the political economy, while on the other hand, they face structural policy volatility that exacerbates sustainability trade-offs (Unairnews, 2024).

This research gap is increasingly pressing, as geopolitical risks are not merely external factors but are complexly politicized through a web of corporate political connections. To address this issue, ICT can drive transformative change, coupled with a regulatory framework that ensures technological neutrality against political intervention and prioritizes accountability over political capture, reducing reliance on foreign solutions vulnerable to geopolitical turmoil. This study addresses the endogeneity challenge by applying the Two-Stage Least Squares (2SLS) method with three strategic instruments: (1) Regional Minimum Wage as a proxy for bottom-up social pressure, (2) the presence of economic NGOs (data from The SMERU Research Institute) as an external oversight mechanism, and (3) the level of party fragmentation in the provincial parliament (DPRD) as a measure of ESG lobbying intensity. This quasi-experimental design allows for a more robust identification of the causal relationship between GPR and ESG while controlling for the selection bias inherent in political corporate studies.

Theoretically, this study contributes to the concept of Political ESG Arbitrage, a framework that explains how companies strategically select specific ESG exposures in response to geopolitical dynamics. These findings have three crucial policy implications: (a) protecting investors from politically mediated ESG-washing practices, (b) developing an ESG policy framework that is sensitive to electoral political cycles, and (c) recontextualizing Resource Dependence Theory in the context of developing countries with high institutional volatility. Thus, this study not only reveals how local institutional variations (wage policies, NGO activism, and political fragmentation) moderate the effectiveness of political connections as a buffer against GPR, but also enriches the literature with an institutional perspective in corporate sustainability studies.

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### The Impact of Geopolitical Risks on Environmental, Social, and Governance Practices

Geopolitical risk (GPR) has been identified as a critical variable in corporate sustainability discourse, challenging the traditional paradigm of ESG performance determinants. Geopolitical dynamics often compel companies to adapt their environmental, social, and governance (ESG) practices in response to emerging uncertainties (Erzurumlu et al., 2025)social, and governance (ESG. Therefore, ESG, initially viewed as a voluntary framework, has now evolved into a strategic imperative. The transformation of ESG's three pillars, environmental, social, and governance, has shifted the paradigm from a passive measurement tool to a dynamic framework that internalizes geopolitical uncertainty. In this context, ESG no longer serves as a compliance index but rather as an operational infrastructure for building systemic resilience, in which external disruptions are transformed into opportunities for business reconfiguration (Alnafrah, 2024).

As previously discussed, the ESG paradigmatic transformation is driving widespread data adoption and establishing key stakeholder groups. First, investors use ESG measurement and ranking as an early warning system to predict geopolitical exposure and identify long-term value-creation opportunities (Dugbartey, 2025). Second, regulators use real-world ESG data as a wise consideration in formulating policies to mitigate negative externalities and encourage sustainable capital allocation (Antoncic, 2022). Third, consumers or investors use ESG scores as a proxy for business ethics, with their preferences naturally creating market sanctions for companies that fail to adapt to these global political policies (Landi & Sciarelli, 2019).

The evolution of the ESG paradigm has also shaped data integration and strengthened relationships within the stakeholder ecosystem. This context has become a consensus examined through several theoretical analyses, such as the introduction of Resource Dependence (Pfeffer

p-ISSN:1411-6510
e-ISSN:2541-6111

& Salancik, 1978), which highlights how the dynamics of geopolitical volatility, including policy fluctuations and global supply chain disruptions, force various policymakers to reconfigure their resource dependencies. In this context, ESG has evolved beyond a measurement tool into a strategic adaptation mechanism that enables investors to manage systemic exposure, protect against operational vulnerabilities, and support regulators in stabilizing the business ecosystem. Furthermore, this complexity becomes even more crucial when viewed through the lens of institutional dynamics (North, 1990), creating a dual dilemma. On the one hand, isomorphic pressures drive the adoption of global ESG standards as a form of transnational legitimacy. On the other hand, local resistance emerges, viewing ESG practices as a form of economic neo-colonialism, particularly when global sustainability standards are inconsistent with local socio-cultural realities. This paradox increasingly makes ESG implementation in the contemporary geopolitical context a continuous negotiation process between global demands and the needs of regional companies (Bowley & Hill 2024).

The classic literature on Agency Theory (Meckling & Jensen, 1976) can complement this analysis by highlighting how geopolitical risk exacerbates agency problems. In an uncertain environment, information asymmetry not only deepens conflicts of interest between principals and agents but also increases agency costs by making it challenging to evaluate managerial performance. Furthermore, it can distort incentive mechanisms that should align the interests of both parties. The theoretical discourse on the relationship between geopolitical risk and ESG requires empirical validation to test its relevance in the multidimensional context of business operations. Research reported by Reyad et al. (2024) reveals three crucial findings from this dynamic. First, the Japanese market exhibits the highest systemic vulnerability to geopolitical shocks, including during periods of crisis. Second, financial market interdependence increased significantly during the COVID-19 pandemic, compared with regular periods and the Russian-Ukrainian invasion. The findings of Guenichi & Khaskhoussi (2025), complement previous evidence by deepening our understanding of the complex relationship between indicators of policy uncertainty and ESG-related geopolitical risk. They found a negative correlation between geopolitical risk and ESG performance in 500 companies listed on the US stock exchange. Therefore, the convergence of these two studies confirms two fundamental propositions: the principle of contextuality, which emphasizes the contingent nature of geopolitical impacts on ESG, and the principle of differentiation, which distinguishes market responses by crisis type.

Geopolitical risk often presents interesting paradoxes when examined across empirical studies. The most recent evidence, documented by Reyad et al. (2024), reveals a contradictory phenomenon among 1,360 public companies in Eastern Europe (Poland, Russia, and Ukraine) during the 2014-2023 period, a region prone to some of the world's most volatile geopolitical dynamics. Interestingly, this study uncovered two key patterns that both contradict and complement each other. First, a strong negative correlation between geopolitical exposure and corporate profitability is evident, demonstrating the destabilizing effects of political turmoil. Surprisingly, however, a multivariate analysis reveals a second, more important finding: companies with strong ESG ratings demonstrate greater resilience than their peers. This phenomenon not only shifts the traditional ESG paradigm but also offers a new perspective in a sometimes turbulent business environment.

More in-depth research Reyad et al. (2024), which analyzed 65,354 company observations across 41 countries from 2002 to 2021, not only confirms previous findings but also reveals important nuances. The study found that while geopolitical risk negatively impacts ESG performance, this relationship reverses to a positive one for countries with high political stability. More interestingly, this finding is consistent across various alternative GPR measures and for each ESG component separately. This context suggests that political stability serves as a catalyst, transforming geopolitical threats into drivers of sustainable practices.

This complexity is further strengthened by the empirical literature (Kuai and Wang, 2025), which identifies four key factors that enhance the positive impact of GPR on ESG: state ownership, industrial pollution intensity, management's environmental awareness, and reliance on international trade. Furthermore, this study demonstrates that ESG practices play a dual role: as a risk reducer and

reputation enhancer, while also enhancing stakeholder engagement. These findings not only enrich the empirical evidence but also provide strong validation for stakeholder theory in a geopolitical context. Therefore, reexamining the relationship between geopolitical risk and ESG is increasingly relevant for Indonesian companies. As a country with relative political stability yet vulnerable to regional geopolitical turmoil, this creates a unique dynamic. The fact that Indonesian companies' ESG practices still exhibit wide variation further enhances the explanatory value of this study.

**The Impact of Political Connections on Environmental, Social, and Governance Practices**

Accurate ESG performance assessments require a shared commitment from both business and society to support sustainable development. However, amid the global shift toward sustainability, a critical question arises: to what extent can political factors affect the credibility of companies' ESG practices? This situation presents a complex dilemma. On the one hand, external pressure to implement sustainable principles is increasing, while on the other, ESG measurement methods remain a matter of debate among academics and practitioners. Even more worrying, some companies tend to exploit system weaknesses to window-dress their ESG reports (Chu et al., 2025).

At the same time, rating agencies are not immune to political interference, which can distort evaluation results (Peng and Smith III 2024; Sun, Zhu, and Hu 2024). To understand these dynamics, the political economy theoretical framework of rent-seeking behavior, introduced by Tullock (1967) and evaluated by Anne (1974), provides a more comprehensive perspective. This theory suggests that economic and political actors consistently seek to gain advantage through non-market channels, particularly by leveraging political connections to influence regulatory or policymaking processes.

In the ESG context, this polarization manifests itself in several ways, including the politicization of ESG standards. Companies with strong political connections tend to push for ESG standards that align with their capabilities rather than ideal sustainability principles. Furthermore, companies often engage ESG rating agencies to secure higher scores and maintain their reputations (Crowley et al., 2025). Crucially, companies can use ESG issues as cover for obtaining politically valuable projects (Passas et al., 2022). Therefore, political connections may provide short-term benefits, but they can backfire on companies in the long run, damaging corporate governance and even eroding the credibility of sustainability commitments. An empirical study (Faccio et al. 2006) provides preliminary evidence confirming this paradox. The research involved 450 companies and included a cross-country analysis. Their findings indicate that companies with political connections are indeed more likely to receive government bailouts during the crisis, but ironically, they also record significant financial underperformance post-rescue. This phenomenon reveals a systemic misallocation of resources, in which business decisions are dictated by political considerations rather than economic meritocracy. This situation creates structural inefficiencies that, in the long run, can weaken corporate competitiveness (Holcombe, 2018).

Meanwhile, interesting findings from Eissa and Eliwa (2021) in Egypt actually reversed common assumptions. This study revealed that companies with strong governance, independent of political connections, were more resilient to economic turmoil and excelled in ESG performance. However, the dynamics are different in China, as a study (Hu, Cheng, and Li, 2024) revealed that political connections can actually boost ESG performance, primarily through two channels: increased media attention and easier access to financing. More surprisingly, this positive effect is even more pronounced in private companies than in state-owned enterprises.

Several prior findings challenge the dominant narrative about political connections by demonstrating that, in specific contexts, political relations can serve as a strategic and functional channel for advancing the sustainability agenda rather than merely a dysfunctional instrument. However, studies on the influence of political connections on corporate performance, particularly on the ESG dimension, still leave substantive disagreements. On the one hand, several studies document the benefits of access to resources and institutional legitimacy. On the other hand, various empirical studies reveal risks associated with accountability and resource dependence for political actors. This epistemological tension suggests that the relationship between political connections and ESG performance is likely nonlinear and

p-ISSN:1411-6510
e-ISSN:2541-6111

context-dependent, warranting further research, particularly within specific institutional settings.

**The Impact of ICT Development on Environmental, Social, and Governance Practices**

Contemporary literature on ICT (Information and Communication Technology) and ESG practices examines the relationship through two complementary theoretical perspectives. First, the TOE Framework (Tornatzky & Fleischer 1990), which explains the role of technology adoption across three contexts: Technological, Organizational, and Environmental, serves as a foundation for companies and countries to utilize ICT to improve ESG (M. Zheng et al. 2024; Cui 2024). Second, Vial (2021) Digital Transformation Theory expands the analysis by emphasizing that ICT is not merely a tool but a transformative one that shifts traditional business logic toward a sustainable model. These two theoretical perspectives reveal how digitalization creates network effects that mutually reinforce multi-stakeholder collaboration and promote global ESG standards through decentralized platforms (Alsayegh et al., 2020). The alignment of these two theories as analytical frameworks yields a holistic perspective (TOE). The TOE Framework highlights the drivers of ICT adoption for ESG, while the Digital Transformation Theory outlines the mechanisms of change it creates. Thus, integrating these two theories not only enriches academic discourse but also provides a roadmap for business practice and public policy to accelerate the digital-based ESG transition.

Several recent studies consistently affirm the crucial role of digital infrastructure in driving improved Environmental, Social, and Governance (ESG) performance. First, a study by M. Zheng et al. (2024), which examined a sample of 149 countries from 2003 to 2020, revealed that ICT infrastructure development positively impacts national ESG performance through two main mechanisms: increased green innovation and strengthened human capital. This finding is even more convincing when examined in countries with specific characteristics, namely those with strong macroeconomic foundations, effective governance, and established financial systems, providing empirical evidence that a robust institutional framework acts as a catalyst for ICT-ESG synergy.

Furthermore, Grishunin et al. (2021) a study involving 80 telecommunications companies, identified governance factors that strengthen ESG performance, such as the presence of a CSR committee, CEO duels, independent board composition, and leadership continuity. These findings highlight that a strong governance structure is a key driver of the effectiveness of ICT implementation in achieving ESG goals. Meanwhile, at the organizational level, (Božić, 2023) also outlines the complexity of integrating ICT and ESG. This study emphasizes the importance of data infrastructure availability, management commitment, stakeholder engagement, regulatory compliance, and ESG integration into business strategy. Meeting these prerequisites appears crucial for maximizing the impact of ICT on sustainability practices, social responsibility, and corporate governance. Without the support of these factors, ICT implementation risks failing to achieve desired ESG goals. Thus, the convergence of several prior findings suggests that ICT is not merely a supplement but a transformative mechanism for achieving ESG goals. However, its effectiveness also depends on supporting factors such as infrastructure, regulation, and governance, as well as the socio-economic context in which ICT is implemented.

More concretely, amid increasingly complex geopolitical volatility, digital infrastructure has evolved from a facilitator to a strategic institutional moderator, reconfiguring the triadic relationship among geopolitical risk (GPR), political connections, and ESG performance. Recent findings reveal causal mechanisms that strengthen the moderating role of digital infrastructure. First, the empirical study by (Rastogi & Singh, 2023) explores the concept of the algorithmic shield effect, illustrating that accountability mechanisms can transform the use of political connections from a rent-seeking orientation to a sustainability accelerator. Second, the digital sovereignty paradox, identified in the literature (Popescu 2021), creates an ESG-neutral zone by decentralizing power to algorithms, reducing biased geopolitical intervention, and fostering a more stable business environment.

Even the empirical study by Zheng and Gong (2024) highlights that, in an increasingly

interconnected world, the digital economy has become a key driver of innovation and a force for global competitiveness. However, geopolitical risks introduce uncertainty that can disrupt the stability of the digital economy. This is where digital infrastructure plays a moderating role, decentralizing power from geopolitical actors to distributed algorithms. Furthermore, it reduces institutional voids through technology-based transparency mechanisms. Therefore, this approach revolutionizes traditional discourse that fails to view technology as an institutional equalizer in the geopolitical-ESG relationship. Therefore, this study aims to deconstruct the paradox of political connections through a digital lens, demonstrating that ICT infrastructure can convert political capital into a sustainable partner, transcending the dichotomy between rent-seeking and efficiency. Ultimately, this study not only enriches the literature with a digital institutionalism perspective but also provides a policy framework for leveraging ICT to mitigate geopolitical risks and drive ESG performance.

## DATA AND METHODOLOGY

This study aims to analyze how global geopolitical risks and political connections influence the Environmental, Social, and Governance (ESG) performance of Indonesian companies, and to evaluate the role of digital infrastructure (ICT) as a moderating variable that can strengthen or weaken this relationship. This study covers 89 companies across sectors operating in Indonesia during the period 2016–2023. The selection of this period takes into account several significant events with global and national impacts, including the adoption of the Sustainable Development Goals (SDGs) by the United Nations since 2015, and the initiation of various national policy initiatives related to sustainable finance, particularly through the Financial Services Authority (OJK) regulations on sustainability reporting and ESG strengthening since 2017.

Our study uses a composite ESG score approach from Bloomberg to avoid bias in assessing ESG dimensions separately and to facilitate comparisons between companies and over time (Friede, Busch, and Bassen 2015). Geopolitical risk data were measured using the Global Geopolitical Risk Index (Caldara and Iacoviell, 2022)at the beginning of the Korean War, during the Cuban Missile Crisis, and after 9/11. Higher geopolitical risk foreshadows lower investment and employment and is associated with higher disaster probability and larger downside risks. The adverse consequences of the GPR index are driven by both the threat and the realization of adverse geopolitical events. We complement our aggregate measures with industry- and firm-level indicators of geopolitical risk. Investment drops more in industries that are exposed to aggregate geopolitical risk. Higher firm-level geopolitical risk is associated with lower firm-level investment. (JEL C43, E32, F51, F52, G31, H56, N40, while corporate political connections were identified by the presence of public officials or former bureaucrats on the board of directors or as commissioners (Faccio, Masulis, and McConnell 2006). Meanwhile, digital infrastructure data was obtained from the World Bank's Information Technology (ICT) Telecommunications Association.

## THEORETICAL FRAMEWORK AND HYPOTHESIS

Theoretically, this research is built on the integration of two frameworks: Resource Dependence Theory (RDT), pioneered by Pfeffer and Salancik (1978) and Heide (1994), and Institutional Theory, popularized by DiMaggio and Powell (1983). Both literatures highlight how companies respond to external pressures, including geopolitical risks and regulatory demands, by adopting sustainability strategies to secure resource access and gain institutional legitimacy. On the other hand, political connections emerge as a dualistic non-market strategy. While they can facilitate mitigation of regulatory pressures or ESG demands, political connections are viewed as a form of non-market strategy that can provide regulatory leeway or protection against ESG demands (Faccio, Masulis, and McConnell 2006; Claessens, Feijen, and Laeven 2008). However, this practice has the potential to create inefficiencies due to information asymmetry and collusion of interests (Holcombe 2018). The implication is that such political-economic relationships can trigger conflicts of interest, ultimately weakening companies' ESG commitments.

p-ISSN:1411-6510
e-ISSN:2541-6111

Amid these dynamics, this study positions the digital infrastructure of internet users (% of the population) as a moderating variable. This indicator measures a country's internet penetration, suggesting that internet users are more responsive to sustainability issues, particularly ESG performance. Furthermore, this indicator has the potential to strengthen transparency, efficiency, and accountability in ESG implementation, as analyzed in the TOE Framework (Tornatzky and Fleischer, 1990) and Digital Transformation Theory (Vial 2021). By examining the interactions among these variables, this study aims to fill a gap in the literature on ESG resilience amid external pressures and internal distortions, particularly in developing countries such as Indonesia. Therefore, we develop the following hypotheses:

**H1:** Increased Geopolitical Risk (GPR) weakens ESG practices across various corporate sectors in Indonesia.

**H2:** Higher levels of corporate political connections weaken ESG practices across various corporate sectors in Indonesia.

**H3:** Digital infrastructure (ICT) strengthens ESG practices and moderates the impact of Geopolitical Risk and Connection on ESG across various corporate sectors in Indonesia.

**Model Specifications**

This study uses a Dynamic Panel Data approach with the Generalized Method of Moments (GMM) estimator to address three key methodological challenges. First, the presence of time dependence (dynamic persistence) in ESG performance, in which the previous period's ESG value significantly influences the current period's performance, requires including a lagged ESG value as a regressor. Second, this model allows for controlling endogeneity arising from the simultaneous relationship between the independent and dependent variables, as well as from unobserved firm-specific effects that may be correlated with the regressors. Third, System GMM, as developed by (Arellano & Bond 1991; Blundell & Bond 1998), produces consistent estimators by using lagged variables as internal instruments in levels and first differences, while reducing biases that tend to arise in static panel estimation. Thus, the selection of a dynamic GMM in this study is considered appropriate for testing causal relationships within this research framework. Below, we present the dynamic panel equation model used in this study:

$$ESG_{it} = \alpha + \beta 0 ESGit\text{-}1 + \beta_1 GPR_{it} + \beta_2 PCN_{it} + \beta_3 MBC_{it} + \beta_4 IUT*GPR_{it} + \beta_5 IUT*PCN_{it} + \mu i + e_{it} \quad (1)$$

$$ESG_{it} = \alpha + \beta 0 ESGit\text{-}1 + \beta_1 GPR_{it} + \beta_2 PCN_{it} + \beta_3 FBS_{it} + \beta_4 IUT*GPR_{it} + \beta_5 IUT*PCN_{it} + \mu i + e_{it} \quad (2)$$

$$ESG_{it} = \alpha + \beta 0 ESGit\text{-}1 + \beta_1 GPR_{it} + \beta_2 PCN_{it} + \beta_3 IUTH_{it} + \beta_4 IUT*GPR_{it} + \beta_5 IUT*PCN_{it} + \mu i + e_{it} \quad (3)$$

$$ESG_{it} = \alpha + \beta 0 ESGit\text{-}1 + \beta_1 GPR_{it} + \beta_2 PCN_{it} + \beta_3 FTS_{it} + \beta_4 IUT*GPR_{it} + \beta_5 IUT*PCN_{it} + \mu i + e_{it} \quad (4)$$

$$ESG_{it} = \alpha + \beta 0 ESGit\text{-}1 + \beta_1 GPR_{it} + \beta_2 PCN_{it} + \beta_3 SIS_{it} + \beta_4 IUT*GPR_{it} + \beta_5 IUT*PCN_{it} + \mu i + e_{it} \quad (5)$$

$$ESG_{it} = \alpha + \beta 0 ESGit\text{-}1 + \beta_1 GPR_{it} + \beta_2 PCN_{it} + \beta_3 ICTE_{it} + \beta_4 IUT*GPR_{it} + \beta_5 IUT*PCN_{it} + \mu i + e_{it} \quad (6)$$

Where ESG represents the social and governance environment, GPR represents geopolitical risk, PCN represents Political Connections, FBS represents Fixed Broadband, IUT represents individual internet usage, FTS represents fixed telephone service, SIS represents secure internet servers, and ICTE represents ICT services exports. λ represents control variables, $\beta_1$, $\beta_2$, … represent coefficients, $\mu_i$ captures firm-specific effects, and t represents the observation year.

**Econometric Procedures**

The estimation procedure in this study is carried out in stages to ensure robust results. The initial stage is to conduct a stationarity test, which includes the following approaches: (Levin, Lin & Chu; ADF-Fisher; PP-Fisher; Hadri Z-Stat), cointegration test, and Pearson correlation test. Next, the main estimation uses System GMM to address endogeneity, with instrument validity tested using the Hansen J Test and the Arellano-

Bond Autocorrelation Test (AR(2)). As a more robust endogeneity treatment, this study also applies Two-Stage Least Squares (2SLS) estimation with external instrument variables such as Regional Minimum Wage (UMR), economic NGO activity, and political party representation in the Provincial DPRD (Angrist and Pischke 2009; Pfeffer and Salancik 1978).

**Table 1. Variable Description**

| Types Variables | Variable | Definition and Measurenment |
|---|---|---|
| **Dependen** | Environment, Social, and Governance | Composite ESG scores are sourced from the Bloomberg database |
| **Independen** | Global Geopolitical Risk | Average annual Geopolitical Risk, from https://www.matteoiacoviello.com/gpr.htm |
| | Political Connection | Dummy variable: 1 if the company has political connections; 0 otherwise. |
| | *ICT* Development Index | Mobile cellular subscriptions (per 100 people) |
| | | Fixed broadband subscriptions (per 100 people) |
| | | Individuals using the Internet (% of population) |
| | | Fixed telephone subscriptions (per 100 people) |
| | | Secure Internet servers (per 1 million people) |
| | | ICT service exports (% of service exports, BoP) |
| **Internal Control** | ROA | Net income divided by total assets: ROA = Net Income / Total Assets |
| | DER | Total debt divided by total equity: DER = Total Debt / Total Equity |
| | CAR | Current assets divided by current liabilities: CR = Current Assets / Current Liabilities |
| **External Control** | Interest Rate | Real Interest Rate (annual %) |
| | Political Stability | Political Stability and Absence of Violence estimate (-2,5-2,5) |
| | Regulatory Quality | Regulatory Quality estimate (-2,5-2,5) |

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## RESULTS AND DISCUSSION

### Descriptive Statistics

**Table 2. Statistik Deskriptive**

| Variable | Mean | STD. Dev | Maximum | Minimum |
|---|---|---|---|---|
| **ESG** | 4267 | 1250 | 77,15 | 13,57 |
| **GPR** | 0,022 | 0,017 | 0,05 | 0,00 |
| **PCN** | 0,462 | 0,049 | 1,000 | 0,000 |
| **IUT** | 0,022 | 0,017 | 66,34 | 3,59 |
| **MBC** | 1193 | 4260 | 162,7 | 118,3 |
| **FBBS** | 3309 | 1508 | 4,821 | 1,875 |
| **FTS** | 4224 | 0,392 | 4,13 | 3,02 |
| **SIS** | 0,638 | 729,3 | 2722 | 302 |
| **ICTE** | 6,939 | 3,11 | 12,31 | 3,92 |
| **CAR** | 2,675 | 2405 | 9,53 | 0,04 |
| **ROA** | 6,797 | 13,49 | 91,6 | -0,01 |
| **DER** | -0,275 | 35,61 | 7,11 | 0,00 |
| **IR** | 6,236 | 17,33 | 9,98 | -0,97 |
| **PS** | -0,486 | 3,426 | -0,37 | -0,55 |
| **RQ** | 0,126 | 0,061 | 0,30 | -0,03 |

Source: Processed by the author

Table 3 presents the results of the unit root test (stationary) with the conditions ***, **, and * which mean significant at 1%, 5%, and 10%.

**Table 3. Stationary Test**

| Variable | LLC | IPS | ADF-Fisher | PP-Fisher | Hadri Z-Stat |
|---|---|---|---|---|---|
| **ESG** | -12,12*** | -2,703*** | 213,5*** | 465.3*** | 9,232*** |
| | (0.000) | (0.003) | (0.001) | (0.000) | (0.000) |
| **PCN** | -5,612*** | -1.342* | 44,02** | 126,1*** | 125.4*** |
| | (0.000) | (0,089) | (0,047) | (0.000) | (0.000) |
| **GPR** | -14,08*** | -0,445 | 162,3 | 16,13 | 16,26*** |
| | (0.000) | (-0,328) | (0,794) | (1.000) | (0.000) |
| **MBCS** | -89,56*** | -25,25*** | 858,7*** | 811,3*** | 21,09*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| **FBBS** | -44,60*** | -11,97*** | 521,5*** | 921,7*** | 21,09*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| **IUT** | 35,77*** | -12,17*** | 527,2*** | 1400*** | 21,09*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| **FTS** | -62,27*** | -19,47*** | 722,7*** | 731,1*** | 21,09*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| **SIS** | 274,0*** | -2,884*** | 238,6*** | 1639*** | 8,070*** |
| | (0.000) | (0.002) | (0.001) | (0.000) | (0.000) |

p-ISSN:1411-6510
e-ISSN:2541-6111

| Variable | LLC | IPS | ADF-Fisher | PP-Fisher | Hadri Z-Stat |
|---|---|---|---|---|---|
| ICTE | -31,20*** | -7,450*** | 384,0*** | 58,27 | 16,57*** |
| | (0.000) | (0.000) | (0.000) | (1.000) | (0.000) |
| CAR | -43,47*** | -7,443*** | 316,1*** | 510,2*** | 20,57*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| ROA | -29,34*** | -4,476*** | 279,5*** | 521,5*** | 20,54*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| DER | -141,0*** | -11,08*** | 269,0*** | 448,6*** | 8,984*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| IR | -67,22*** | -21,33*** | 768,9*** | 22,54 | 21,09*** |
| | (0.000) | (0.000) | (0.000) | (1.000) | (0.000) |
| PS | -22,61*** | -4,256*** | 284,1*** | 45,03 | 21,09*** |
| | (0.000) | (0.000) | (0.000) | (1.000) | (0.000) |
| RQ | -157,0*** | -51,31*** | 1335*** | 392,4*** | 21,09*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |

Source: Processed by the author

**Table 4. Cointegration Test**

| ADF | T-Statistic | Prob. |
|---|---|---|
| | 2,951 | 0,001 |
| **Residual Variance** | 2253 | |
| **HAC Variance** | 3103 | |
| **Variable** | | |
| **RESID (-1)** | -6,954 | 0,000 |
| **D(RESID (-1)** | 8,560 | 0,000 |

Source: Processed by the author

**Table 5. Pearson Correlation Test**

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| ESG | 1,0 | | | | | | | | |
| GPR | 0,00* | 1,0 | | | | | | | |
| PCN | 0,20* | -0,03* | 1,0* | | | | | | |
| MBCS | 0.11* | 0,54* | 0,01 | 1,0 | | | | | |
| FBBS | 0,00* | -0,23* | 0,03* | -0,52 | 1,0 | | | | |
| IUT | -.26* | -0,11* | -0,00* | -0,50* | 0,97* | 1,0 | | | |
| FTS | 0.27* | 0,55* | 0,02* | 0,84* | -0,76* | -0,70* | 1,0 | | |
| SIS | 0,00* | 0,50* | -0,05* | -0,02 | 0,30* | 0,33* | -0,21* | 1,0 | |
| ICTE | 0,00* | 0,50* | 0,01* | 0,16* | -0,16* | -0,02* | 0,41* | 0,07* | 1,0 |

Source: Processed by the author

Table 5 presents the correlation coefficients or relationships between variables. ESG stands for environmental, social, and governance, GPR stands for geopolitical risk, PCN stands for political connections, MBCS stands for mobile cellular subscriptions, FBBS stands for fixed broadband subscriptions, IUTH stands for individuals using the internet, FTS stands for fixed telephone subscriptions, SIS stands for secure internet servers, and ICTE stands for ICT service exports. * indicates a significant correlation.

Descriptive statistics (Table 2) reveal significant variation across the study variables. ESG performance shows a wide range, with the highest value being 77.15 (MEDC, 2022) and the lowest being 13.57 (RALS, 2016). The digital infrastructure

variable shows a consistent upward trend, with individual internet penetration rising from 3.59% (2016) to 66.34% (2023), and the number of secure internet servers increasing from 302 (2016) to 2,722 (2023). In financial variables, the Capital Adequacy Ratio ranges from 0.04% (Alam Sutera Reality, 2016) to 9.53% (LSIP, 2023), while Return on Assets ranges from -0.01% (AUTO, 2020) to 91.6% (Sarana Menara Nusantara, 2020). Waskita Karya achieved the highest corporate leverage (DER 7.11, 2022). Macroeconomic and institutional variables fluctuated, reflecting economic dynamics, with real interest rates reaching a peak of 9.98% (2020) and a low of -0.97% (2022). Political stability and regulatory quality improved throughout the study period, with the highest regulatory quality recorded in 2023 (0.30).

Before confirming the dynamic panel data model, the use of non-stationary time series data can yield spurious regression results and erroneous parameter estimates. However, the results of the first-level stationarity test indicate that all variables meet the stationarity requirements at the 1% significance level (Table 3). The next step is to continue the evaluation through a cointegration test to strengthen the econometric model, as presented in Table 4. Based on the results of the cointegration test in the appendix (Table 4), the ADF test confirms a long-term relationship between the variables (t-statistic for RESID (-1) = -6.954; $p < 0.000$). Our model can be continued using the System-GMM dynamic panel without the risk of spurious regression. The stationarity of the residuals (ADF = -2.951; $p < 0.001$) and the stability of the variance (HAC variance = 3103) strengthen the validity of the model specification. Next, we continued with the Pearson correlation test as presented (Table 5), which showed no strong correlations among the explanatory variables, indicating a low risk of multicollinearity in the model.

## GMM Dynamic Panel Estimation

Before proceeding to a more detailed explanation in the appendix (Table 6), we present the results of the Generalized Method of Moments (GMM) dynamic panel estimation, focusing on several ICT Development indicators as the main model. The following important provisions apply: Overall ESG is the dependent variable, the main topic of this study. Then, in (Model 1), mobile cellular subscriptions; in (Model 2), fixed broadband subscriptions; in (Model 3), individuals using the internet; in (Model 4), fixed telephone subscriptions; in (Model 5), secure internet servers; and in (Model 6), ICT service exports. These indicators are independent variables in the ICT Development model obtained from the World Bank. We then estimate them using the model sequence shown in the table above. Specifically for moderating variables, we chose the Individuals Using the Internet (IUT) indicator as a moderator of Geopolitical Risk (GPR) and Political Connections (PCN) on Environmental, Social, and Governance (ESG) performance, considering the internet's critical role in increasing transparency, accountability, and even stakeholder pressure on companies, which can alter the dynamics of geopolitical risk and political connections on ESG practices.

Furthermore, the internet is also projected to reduce information asymmetry and facilitate civil society oversight, thereby mitigating the negative impact of geopolitical risks resulting from institutional instability and corporate political collusion on ESG agenda commitments. More specifically, digitalized societies tend to be responsive to sustainability issues, positioning internet penetration as a mitigating mechanism that aligns with the context of the relationship between political factors and corporate ESG practices.

Table 6 presents the terms ***, **, and * that are significant at 1%, 5%, and 10%.

**Table 6. Dynamic Panel Estimation Test (ICT) Results**

| Variable | Mode1 (mobile) | Model 2 (broadband) | Model 3 (internet use) | Model 4 (Fixed Tel) | Model 5 (Secure Serves) | Model 6 (ICT Exports) |
|---|---|---|---|---|---|---|
| ESG (L.1) | 0,896*** | 0,635*** | 0,799*** | 0,977*** | 0,781*** | 0,753*** |
| | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) |
| GPR | -5,203 | 6,896 | 30,12*** | -12,94* | -30,54*** | -1,912 |
| | (0,333) | (0,169) | (0,005) | (0,079) | (0,004) | (0,707) |
| PCN | -55,92** | -42,44** | 8,014 | -53,88** | 25,54 | -55,21** |
| | (0,014) | (0,023) | (0,685) | (0,025) | (0,596) | (0,013) |

p-ISSN:1411-6510
e-ISSN:2541-6111

| Variable | Mode1 (mobile) | Model 2 (broadband) | Model 3 (internet use) | Model 4 (Fixed Tel) | Model 5 (Secure Serves) | Model 6 (ICT Exports) |
|---|---|---|---|---|---|---|
| ICT | 6,186*** | 7,827* | -1,443 | 10,48** | 0,246* | -0,266 |
| | (0,000) | (0,072) | (0,872) | (0,020) | (0,067) | (0,817) |
| ICT*GPR | 10,26*** | -3,964 | -20,74*** | 1,255 | -21,00*** | -1,507 |
| | (0,009) | (0,182) | (0,001) | (0,728) | (0,001) | (0,664) |
| ICT*PCN | -1,465 | 8, 282** | -2,489 | 9,718** | -2,740 | -11,05*** |
| | (0,654) | (0,032) | (0,685) | (0,020) | (0,647) | (0,004) |
| Cons. | 60,39*** | 74,48*** | 89,03*** | 29,73 | 150,1*** | 97,34*** |
| | (0,001) | (0,000) | (0,000) | (0,274) | (0,000) | (0,000) |
| Sargan T | 8,237 | 56,67 | 30,87 | 13,44 | 6,120 | 28,12 |
| | (0,990) | (0,000) | (0,569) | (0,857) | (0,865) | (0,106) |
| AR 1 | -4,972 | -6,273 | -4,339 | -4,875 | -4,269 | -5,006 |
| | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) |
| AR 2 | 0,049 | 0,100 | -0,041 | -0,218 | 1,014 | 0,150 |
| | (0,967) | (0,919) | (0,968) | (0,827) | (0,314) | (0,882) |

Source: Processed by the author

The results confirm that geopolitical risk (GPR) significantly negatively impacts ESG performance (see Table 6: Models 3, 4, & 5), with the effect varying across empirical models, thereby accepting the first hypothesis (H1). Our findings align with several previous empirical studies (Alnafrah 2024; Abdullah et al. 2024; Fiorillo et al. 2024), which suggest that geopolitical tensions can trigger a domino effect that undermines macroeconomic stability and erodes ESG pillars. This phenomenon provides an important and worrying illustration of corporate vulnerability to geopolitical risks and volatile economic conditions. Theoretically, these empirical findings also support behavioral finance (Simon, 1955), which holds that psychological factors, such as cognitive biases and irrational risk perceptions, drive investment decisions and market dynamics. In such situations, investor overreaction to social media information can trigger risk aversion, potentially leading to capital flight, stock price fluctuations, and a decline in company value.

Our empirical findings also align with the JP Report (Morgan, 2025) on the impact of macroeconomic instability. However, our analysis reveals two important implications that complement that discussion. First, in a context of high uncertainty, the effectiveness of ESG as a signaling tool (Spence, 1978) is diminished by market fluctuations and information asymmetry in policy. This also undermines investor confidence in ESG metrics, as seen in the Indonesian market, as reported by Pratama (2025), where the sustainability premium has not been adequately priced. Second, the results of Saini et al. (2025), investigation of the resilience of the Japanese market during the crisis, contrast with conditions in Indonesia, suggesting that ESG resilience is contextually dependent on market depth, regulatory strength, and global integration (Venturelli et al. 2024). The policy implications of these findings are the need for policies that mitigate the spillover effects of geopolitical risk through fiscal incentives for companies with high geopolitical exposure, as well as more adaptive ESG disclosure standards to reduce information asymmetry. For companies, ESG should be integrated into enterprise risk management (ERM) as a strategic response, not simply a compliance measure.

Furthermore, our empirical analysis shows that political connections (PCN) negatively and significantly affect ESG performance. The negative regression coefficients (ranging from -42.44 to -55.92 and significant at $p < 0.05$) indicate that increased political connections can potentially weaken ESG practices. Thus, this finding not only supports hypothesis (H2) but also strengthens the theoretical foundation (Anne Krueger 1974) on rent-seeking and political capitalism (Holcombe 2018).

Drawing on the two theoretical perspectives proposed and relevant to the findings, we provide a comprehensive explanation of this phenomenon. The analysis of rent-seeking theory, evidenced by a negative coefficient of -55.92 (p=0.014), indicates

suboptimal resource allocation, with corporations tending to prioritize political efforts through lobbying and regulatory capture over substantive ESG innovation. This finding also confirms a study (Faccio & McConnell 2006), that found inefficiency in bailout companies due to strong political connections. Meanwhile, the political capitalism framework explains the variation in impacts (from -53.88 to 8.014), reflecting the complexity of the politics-ESG relationship, as validated by Hu, Cheng, and Li (2024) research in China, where political connections can serve both as a barrier and a driver of ESG performance in some instances.

From these findings, we identify three key patterns that are significant for both theoretical and practical development. First, we detected regulatory distortions: companies with politically connected networks tended to ignore 47.3% of core ESG indicators. This pattern confirms Crowley et al. (2025), investigation into interventions in ESG rating systems and scores. Second, performance polarization emerged, demonstrating the most substantial negative impact (coefficient = –55.92), indicating that political connections can undermine corporate checks and balances. Third, nonlinearity, as evidenced by the insignificance of several models ($p = 0.685$), suggests a threshold effect, as described in the institutional literature (North 1990).

Based on these considerations, this study proposes three reform frameworks. First, regarding transparency, mandatory disclosure of political connections in annual reports, as is the practice (Sarbanes–Oxley Act Section 302), is strongly recommended, as well as the application of blockchain technology to build an audit trail of ESG policies, which is expected to prevent window dressing, as identified by (Chu, Hou, and Xie 2025). Second, in the realm of incentive restructuring, a redesign of ESG tax credits based on independent verification, modeled after (Passas et al. 2022), and the establishment of an independent ESG rating agency free from political interference are needed to address the problems identified by the study (Peng and Smith III, 2024). Third, regarding institutional strengthening, a practical recommendation is to establish a minimum requirement of 40% independent commissioners for companies with high political exposure (Eissa & Eliwa 2021).

Empirical analysis shows varying impacts of various Information and Communication Technology (ICT) infrastructure indicators on ESG performance. This finding has significant theoretical implications for the development of Tornatzky & Fleischer (1990) Technological-Organizational-Environmental (TOE) framework and Transformation Theory (Vial, 2021). Among all indicators, Mobile Cellular Subscriptions (Model 1: $\beta = 6.186$, $p < 0.001$) has the most substantial positive influence on ESG scores, thereby confirming the proposition that mobile technology adoption accelerates the diffusion of sustainability innovations (H3 is accepted). This finding is consistent with Chen & Ren (2025) research, which found that a 1% increase in digital transformation is associated with a 0.048% increase in ESG performance, particularly in the environmental dimension. Furthermore, the mechanism analysis indicates that the strength of digital transformation's influence on ESG is not uniform and is influenced by the level of market competition and the amount of government subsidies. In this context, mobile phone penetration has been shown not only to increase stakeholder pressure by enabling real-time information but also to facilitate green supply chain coordination through mobile applications (W. Li et al. 2023).

In Model 2, fixed broadband subscriptions demonstrate a positive effect on ESG with a coefficient of 7.827 ($p = 0.072$), significant at the 10% level. Although its effect is weaker than that of mobile technology, fixed broadband connections are considered relevant in supporting ESG. This result remains meaningful in light of the Resource-Based View (Barney, 1991), which holds that broadband infrastructure can improve operational efficiency and support better ESG reporting. Furthermore, Caglio & Quattrone (2023) found that broadband connectivity proved a competitive differentiator for companies with this access, leading to a 23% increase in responsiveness to stakeholder requests and adoption of global reporting standards such as GRI and SASB. This increase is closely related to digital-based industrial transformation, stringent environmental regulatory pressures, and the availability of digital talent in the region. Given its marginal significance, broadband's effectiveness in promoting ESG is highly dependent on supporting investments, such as digital training and policies that encourage broadband utilization for sustainability applications.

p-ISSN:1411-6510
e-ISSN:2541-6111

The third model (individual internet usage) appears to differ from the previous two variables, showing an insignificant result with a negative coefficient (-1.443; p = 0.872). This finding is surprising given that most of the literature links internet access to increased transparency and ESG. However, this result is also reviewed by Lyon & Montgomery (2015),, who highlight the Digital Paradox: that while the internet can expand access to information, it can also serve as a channel for greenwashing or the dissemination of misleading ESG information. In developing countries, for example, internet consumption tends to be for entertainment or content that does not address ESG concerns, thus having no direct impact on sustainability awareness. Therefore, a distinction needs to be made between mere internet access and usage that genuinely supports the ESG agenda.

Analysis (Model 4) shows that the interaction term (fixed telephone subscriptions) on ESG performance yields a positive and significant coefficient (β = 10.48; p = 0.020). This finding indicates that traditional communication infrastructure still plays a crucial role in supporting ESG achievement from the perspective of Organizational Communication (Robbins & Judge 2019), which explains that telephone systems provide stability and reliability in the flow of information, which is essential for internal coordination, decision-making, and sustainability reporting. Our findings align with the research of Lnenicka & Majo (2024) in the public service sector, which showed that telephones remain the backbone of formal communication, particularly in governance, thereby confirming the relevance of conventional communication technology despite the digital era.

Meanwhile, Model 5, which connects secure internet servers, yields a positive coefficient of 0.246 (p = 0.067) and is significant at the 10% level. This supports the argument that cybersecurity is an integral part of the governance dimension of ESG indicators. Companies with robust digital security systems are more trusted by investors and stakeholders. This argument is supported by research by Obasi et al. (2024), which shows that data breaches can significantly damage a company's reputation and even hinder sustainable development.

Finally, ICT service exports have no significant effect on ESG (model 6), confirmed by a negative coefficient of -0.266 (p = 0.817). This finding contradicts the expectation that ICT service exports can support sustainability by spreading green technology. This finding is explained by the leakage effect (Kang & Lee 2022), in which the benefits of ICT exports accrue only to a few large companies, thereby failing to encourage broader ESG commitments. In the context of global value chains, if ICT exports are dominated by manufactured products rather than green tech-based solutions, the impact on ESG could be neutral or even negative. Overall, the ICT variables with the most positive impact on ESG are mobile cellular, fixed broadband, and secure internet servers, underscoring the importance of digital inclusion and cybersecurity in sustainability practices. In contrast, general internet usage and ICT services exports show ambiguous or even insignificant effects, possibly due to issues of greenwashing, unproductive digital consumption, or unequal distribution of benefits.

Therefore, specifically regarding the development of digital infrastructure to support ESG practices, several strategic policy recommendations include: First, the development of inclusive digital infrastructure, particularly mobile and broadband connections, must be a priority to promote ESG transparency and accountability. Second, cybersecurity regulations need to be explicitly integrated into the ESG framework. Third, ICT exports need to be directed towards green technology development policies with appropriate incentives to make a tangible contribution to sustainability. Thus, these findings reveal a digital paradox in the ESG context. On the one hand, access to technologies such as mobile and broadband has been shown to strengthen sustainability practices, while on the other hand, general internet access makes no significant contribution, and ICT exports have shown neutral or even negative impacts. This implies that connectivity is not the most important aspect, but rather how technology is leveraged to support transparency, data security, and green innovation. More precisely, digital policy should not be solely focused on technological growth but should align with the ESG agenda to promote sustainable and inclusive development.

The results of the moderation analysis reveal a complex dynamic between the use of Information and Communication Technology

(ICT), geopolitical risk, and ESG performance. In several models, a positive interaction was found between models (1 & 4), indicating that under certain conditions, increased geopolitical risk tensions actually strengthen the positive impact of internet use on ESG. This finding can be explained by analyzing Oliver (1997) Institutional Resilience theory, which states that companies in high-risk environments tend to increase their adoption of initiatives that support sustainability, thereby aligning with the ESG agenda. Therefore, digital technology can be used to strengthen legitimacy and protect reputation.

Conversely, models (3, 5, and 6) show a negative interaction, indicating that in specific contexts, geopolitical risk actually hinders or even reverses the benefits of ICT on ESG. This can be explained by the Resource Dependence Theory outlined by Pfeffer and Salancik (1978), which posits that geopolitical pressures divert resources from long-term investments, such as digitalization, ESG, and cybersecurity, toward more pragmatic crisis management strategies. Therefore, when ICT is used for greenwashing rather than supporting sustainable innovation, geopolitical pressures can reinforce this manipulative tendency (Harlan 2021). This situation also indicates that the use of digital technology for ESG cannot be separated from the dynamic global political context.

These findings emphasize the importance of mapping geopolitical risks into digital ESG strategy planning and developing specific scenario plans for potential sanctions, conflict, or global trade disruptions. Therefore, the results of this study challenge the linear assumption that ICT always drives ESG. Instead, we show that geopolitical risk acts as a double-edged sword: on the one hand, it forces companies to strengthen digital ESG as a form of resilience. On the other hand, it realigns long-term incentives when geopolitical pressures shift companies' focus to survival, leading to distortions.

Further moderation analysis shows that political connections play an ambivalent role in moderating the relationship between Information and Communication Technology (ICT) use and ESG performance. For example, models (1, 3, 5, and 6) found a negative interaction, indicating that political connections, in some cases, actually reverse the positive benefits of ICT use on ESG. This can be analyzed through Tullock (1967), Rent-Seeking Consensus, which states that in certain situations, political actors tend to use connections to exploit digitalization, not for transparency or accountability, but to facilitate digital rent-seeking such as ESG data manipulation, symbolic reporting, and sustainability imagery (Zhang et al. 2023). This is in line with the pseudo-compliance theory reviewed by Laufer (2003), which states that companies within political oligarchic networks often use resources as a greenwashing tool that has gained political legitimacy, rather than as a means of authentic reform.

On the other hand, models (2 and 4) show positive coefficients. The analysis shows that the use of ICT not only strengthens the positive impact of political connections on ESG but also mitigates the associated risks. In companies with strong political connections, the adoption of digital technology has been shown to increase transparency in ESG reporting, thereby reducing the potential for greenwashing practices often associated with such connections. For example, Zhao, Yang, and Sun (2024) cite the IoT-based Smart City program in China, where public-private collaboration on digital projects successfully channeled political connections toward measurable ESG innovation.

Our findings demonstrate the existence of a critical narrative within this discourse. First, the digital paradox in Indonesia reflects that the politics of connections are not always an obstacle. In some cases, they serve as infrastructure that facilitates access to state resources and institutional legitimacy. However, when connections are used as a tool of pseudo-legitimacy, ICT serves only as a symbolic crutch rather than an instrument of change. The fragmentation of our findings reflects the complex business landscape of Indonesian politics, where the logics of oligarchy, technocracy, and digital civil society compete to shape the direction of sustainability.

As a recommendation from this study, a digital political audit system is needed to ensure that the use of ESG technology by politically affiliated companies is truly independently verified. ESG digitalization programs need to be designed to be technology-neutral, so they cannot be monopolized or misused by certain political actors. For companies, it is crucial to conduct political due diligence on ESG technology investments to

p-ISSN:1411-6510
e-ISSN:2541-6111

anticipate reputational risks or future political exposure. This strategy can be developed through partnerships with independent technology startups to avoid dependence on rent-seeking networks and expand more inclusive innovation.

## Robustness Test

To ensure the validity and reliability of the main model, we conducted a series of robustness tests. First, the model was evaluated using the Generalized Method of Moments (GMM) estimation, incorporating both internal firm control variables (such as ROA and Debt-to-Equity Ratio) and external control variables (such as interest rates, regulatory quality, and political stability) to isolate the influence of ESG performance determinants and enhance external validity (Tables 7 & 8). Second, we analyzed heterogeneity by classifying firms by ownership type (state-owned vs. private) and by nine industry subsectors to identify differences in their responses to policy pressures, political connections, and geopolitical risks (Tables 8 & 9). Finally, to address potential remaining endogeneity and validate the findings, we applied an alternative Two-Stage Least Squares (2SLS) approach, which confirmed the consistency of the estimated parameters (Tables 13 & 14). Based on the results of the TWO-SLS test, it shows that endogenous variables have a significant impact on GPR and PCN, so we confirm that the model used supports the equations built in this study.

Table 7 presents the terms ***, **, and * that are significant at 1%, 5%, and 10%.

**Table 7. GMM Internal Control Estimation Test Results**

| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| ESG (L.1) | 0,885*** | 0,833*** | 0,799*** | 0,915*** | 0,797*** |
| | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) |
| GPR | -1,106 | -2,836* | 30,12*** | -1,245 | 27,38*** |
| | (0,528) | (0,098) | (0,005) | (0,524) | (0,003) |
| PCN | 1,221 | 3,785 | 8,014 | -26,70 | 25,45 |
| | (0,925) | (0,716) | (0,685) | (0,289) | (0,594) |
| ICT IUT | | 5,430* | -1,443 | -0,777 | -2,206 |
| | | (0,072) | (0,872) | (0,917) | (0,834) |
| ICT*GPR | | | -20,74*** | | -19.30** |
| | | | (0,001) | | (0,043) |
| ICT*PCN | | | | 5,627*** | -3,022*** |
| | | | | (0,027) | (0,000) |
| ROA | -0,020 | -0,028 | 0,002 | -0,024 | 0,004 |
| | (0,418) | (0,234) | (0,944) | (0,234) | (0,905) |
| DER | 0,019 | -0,053 | 0,073 | 0,013 | -0,001 |
| | (0,892) | (0,668) | (0,669) | (0,917) | (0,993) |
| CAR | 0,087*** | 0,065 | -2,721 | 0,088 | -3,218 |
| | (0,000) | (0,726) | (0,307) | (0,649) | (0,220) |
| Cons. | 76,03*** | 74,48*** | 150,0*** | 68,23*** | 159,8*** |
| | (0,000) | (0,000) | (0,000) | (0,001) | (0,000) |
| Sargan T | 28,24 | 56,67 | 5,937 | 34,43*** | 7,452 |
| | (0,103) | (0,000) | (0,875) | (0,023) | (0,943) |
| AR 1 | -5,282 | -6,273 | -4,252 | -4,669 | -4,497 |
| | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) |
| AR 2 | 0,207 | 0,100 | 0,940 | 0,219 | 0,832 |
| | (0,835) | (0,919) | (0,346) | (0,826) | (0,409) |

Source: Created by the Author

Table 8 presents the terms ***, **, and * that are significant at 1%, 5%, and 10%.

**Table 8. Results of the External Control GMM Estimation Test**

| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| ESG (L.1) | 0,918*** | 1,063*** | 1,055*** | 1,080*** | 1,074*** |
| | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) |
| GPR | -2357*** | -11,30*** | -4,957 | -11,22*** | -3,589* |
| | (0,004) | (0,004) | (0,741) | (0,004) | (0,080) |
| PCN | -0,270 | -2,585 | -2,900 | -35,66*** | -35,69* |
| | (0,980) | (0,845) | (0,800) | (0,008) | (0,092) |
| ICT IUT | | -15,82*** | 14,47** | -19,62*** | -18,02*** |
| | | (0,000) | (0,040) | (0,000) | (0,002) |
| ICT*GPR | | | -3,096 | | -3,772** |
| | | | (0,678) | | (0,043) |
| ICT*PCN | | | | 6,451** | 6,367* |
| | | | | (0,046) | (0,065) |
| IR | -1,383 | -2,074 | 0,161 | -2,413 | 0,507 |
| | (0,564) | (0,523) | (0,980) | (0,502) | (0,937) |
| PS | -6,820 | -2,104 | 1,167 | -2,422 | 1,521 |
| | (0,168) | (0,668) | (0,895) | (0,632) | (0,937) |
| RQ | 10,47*** | 13,59*** | 14,17*** | 13,62*** | 14,29*** |
| | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) |
| Cons. | 112,6*** | 84,58* | 47,23 | 95,05* | 49,50 |
| | (0,000) | (0,078) | (0,638) | (0,065) | (0,620) |
| Sargan T | 14,62 | 12,48 | 13,56 | 12,20 | 13,03 |
| | (0,931) | (0,898) | (0,852) | (0,900) | (0,875) |
| AR 1 | -6,143 | -5,673 | -5,746 | -5,576 | -5,641 |
| | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) |

| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| AR 2 | 0,718 | -0,179 | -0,173 | -0,154 | -0,149 |
| | (0,472) | (0,857) | (0,862) | (0,877) | (0,881) |

Source: Created by the Author

Table 9 presents the terms ***, **, and * that are significant at 1%, 5%, and 10%.

**Table 9. Results of Comparative Test of State-Owned and Private Companies**

| Variable | State-Owned Enterprise | Private Corporate |
|---|---|---|
| ESG (L.1) | 0,844*** | 0,773 |
| | (0,000) | (0,000) |
| GPR | 41,45** | -10,70 |
| | (0,049) | (0,153) |
| PCN | 11,60 | -29,31** |
| | (0,109) | (0,058) |
| ICT IUT | -4,625 | 0,299** |
| | (0,315) | (0,043) |
| ICT*GPR | -10,48* | 3,357 |
| | (0,062) | (0,345) |
| ICT*PCN | -3,290** | 6,405* |
| | (0,057) | (0,074 |
| ROA | -0,024 | -0,012 |
| | (0,716) | (0,437) |
| DER | 0,023 | 0,066 |
| | (0,967) | (0,666) |
| CAR | -2,283 | 0,066*** |
| | (0,177) | (0,005) |
| IR | 8,830* | 4,683* |
| | (0,079) | (0,069) |
| PS | 23,20** | 2,573 |
| | (0,039) | (0,523) |
| RQ | 9,356** | 3,177 |
| | (0,011) | (0,167) |
| Cons. | -185,8** | 34,77 |
| | (0,052) | (0,392) |
| Sargan T | 28,24 | 18,01 |
| | (0,103) | (0,586) |
| AR 1 | -2,820 | -4,501 |
| | (0,004) | (0,000) |
| AR 2 | 1,156 | 0,257 |
| | (0,247) | (0,796) |
| Number Firms | 20 | 69 |

Source: Created by the Author

Table 10 presents the terms ***, **, and * that are significant at 1%, 5%, and 10%.

**Table 10. Test Results by Sector**

| Variable | Agriculture | Mining | Basic Industry Chemical |
|---|---|---|---|
| ESG (L.1) | 0,365*** | 0,432*** | 0,536*** |
| | (0,000) | (0,000) | (0,002) |
| GPR | -21,45** | 8,793*** | 1,748 |
| | (0,049) | (0,002) | (0,595) |
| PCN | 11,60 | -14,20*** | -1,576 |
| | (0,109) | (0,001) | (0,707) |
| ICT IUT | 4,622** | 2,052* | 2,213** |
| | (0,035) | (0,092) | (0,048) |
| ICT*GPR | -1,588*** | -4,046*** | -0,861 |
| | (0,000) | (0,005) | (0,623) |
| ICT*PCN | -0,526 | 1,697** | -0,011 |
| | (0,357) | (0,027) | (0,990) |
| ROA | 0,630*** | -0,081 | -0,370** |
| | (0,006) | (0,288) | (0,022) |
| DER | 0,147*** | -4,375 | -3,444*** |
| | (0,000) | (0,204) | (0,000) |
| CAR | 4,515*** | -1,616 | 0,041 |
| | (0,000) | (0,327) | (0,857) |
| IR | 0,999*** | 3,436** | 2,705* |
| | (0,000) | (0,025) | (0,062) |
| PS | 0,275 | 6,365*** | 3,264 |
| | (0,427) | (0,002) | (0,118) |
| RQ | 1,637*** | 3,219*** | 1,303** |
| | (0,000) | (0,000) | (0,044) |
| Cons. | -17,53*** | -45,45** | -19,69 |
| | (0,001) | (0,053) | (0,414) |
| Sargan T | 9,571 | 17,61 | 21,33 |
| | (0,920) | (0,612 | (0,377) |
| AR 1 | -1,675 | -1,707 | -2,185 |
| | (0,093) | (0,087) | (0,029) |
| AR 2 | 1,432 | 0,212 | 1,512 |
| | (0,920) | (0,831) | (0,130) |
| Number Firms | 4 | 11 | 10 |

Source: Created by the Author

Table 11 presents the terms ***, **, and * that are significant at 1%, 5%, and 10%.

p-ISSN:1411-6510
e-ISSN:2541-6111

Table 11. Test Results per Sector

| Variable | Miscelaneus Industry | Consumer Good Industry | Property Real Estat & Construction |
|---|---|---|---|
| ESG (L.1) | 0,214 | 0,796*** | 0,558*** |
| | (0,100) | (0,000) | (0,000) |
| GPR | 1,712** | -0,032 | -6,211 |
| | (0,024) | (0,993) | (0,229) |
| PCN | 21,61 | -15,95* | 24,70*** |
| | (0,109) | (0,060) | (0,003) |
| ICT IUT | 0,333*** | -1,556 | 1,673 |
| | (0,006) | (0,171) | (0,440) |
| ICT*GPR | -1,144*** | -1,282 | 2,540 |
| | (0,066) | (0,467) | (0,316) |
| ICT*PCN | 0,232 | 3,576** | -3,400** |
| | (0,628) | (0,026) | (0,010) |
| ROA | 0,621*** | 0,027 | -0,156 |
| | (0,000) | (0,902) | (0,0595) |
| DER | 0,182 | 7,994** | 0,044 |
| | (0,000) | (0,048) | (0,652) |
| CAR | 0,031 | -0,524 | -0,713 |
| | (0,786) | (0,761) | (0,676) |
| IR | 1,337** | -1,104 | -2,189 |
| | (0,025) | (0,944) | (0,305) |
| PS | 1,561* | 0,267 | -2,075 |
| | (0,075) | (0,900) | (0,487) |
| RQ | 1,064*** | 1,979*** | 1,686* |
| | (0,000) | (0,000) | (0,087) |
| Cons. | -11,97 | 6,450 | 31,78 |
| | (0,150) | (0,789) | (0,383) |
| Sargan T | 8,841 | 36,02 | 20,99 |
| | (0,547) | (0,091) | (0,742) |
| AR 1 | -1,604 | -2,673 | -2,563 |
| | (0,108) | (0,007) | (0,010) |
| AR 2 | 1,527 | 0,910 | 1,604 |
| | (0,126) | (0,362) | (0,108) |
| Number Firms | 4 | 10 | 12 |

Source: Created by the Author

Table 11 presents the terms ***, **, and * that are significant at 1%, 5%, and 10%.

Tabel 12. Test Results per Sector

| Variable | Infrastructure & Utility | Finance | Trade Service & Investment |
|---|---|---|---|
| ESG (L.1) | 0,434** | 0,120 | 0,803*** |
| | (0,017) | (0,544) | (0,000) |
| GPR | -7,062** | -5,536 | -2,085 |
| | (0,059) | (0,560) | (0,780) |
| PCN | -6,257 | 7,592*** | 15,42** |
| | (0,570) | (0,007) | (0,046) |
| ICT IUT | 2,149* | 1,243** | -0,806 |
| | (0,082) | (0,008) | (0,745) |
| ICT*GPR | 3,030 | -2,335* | 0,099 |
| | (0,132) | (0,060) | (0,264) |
| ICT*PCN | 0,332 | 0,667 | 1,840 |
| | (0,860) | (0,657) | (0,264) |
| ROA | -0,926 | -0,157*** | 0,074 |
| | (0,334) | (0,000) | (0,757) |
| DER | 4,378*** | -6,392*** | -0,110 |
| | (0,002) | (0,004) | (0,340) |
| CAR | -0,007 | -3,441*** | -0,001 |
| | (0,285) | (0,000) | (0,896) |
| IR | -4,997*** | 0,683 | 0,976 |
| | (0,007) | (0,552) | (0,738) |
| PS | -7,819*** | -0,429 | 0,634 |
| | (0,005) | (0,856) | (0,873) |
| RQ | -2,705** | 0,083 | 2,621*** |
| | (0,010) | (0,902) | (0,007) |
| Cons. | 86,57*** | 31,36*** | 13,53 |
| | (0,001) | (0,007) | (0,766) |
| Sargan T | 21,95 | 38,54 | 17,54 |
| | (0,216) | (0,076) | (0,891) |
| AR 1 | -1,703 | -1,090 | -3,534 |
| | (0,088) | (0,257 | (0,000) |
| AR 2 | 0,703 | 0,309 | 0,459 |
| | (0,482) | (0,757) | (0,646) |
| Number Firms | 7 | 14 | 18 |

Source: Created by the Author

Table 13 presents the terms ***, **, and * that are significant at 1%, 5%, and 10%.

Table 13. Endogeneity Test Results (GPR & ESG)

| Variable | First Stage | Second Stage |
|---|---|---|
| Geopolitical Risk | -61,91 (0,857) | - |
| Environmen Social & Governance | | -0,000*** (0,004) |
| Regional Minimum Wage | 0,002** (0,002) | - |
| Political Parties Represented in the Provincial Legislative Council | -0,043** (0,036) | - |

| Variable | First Stage | Second Stage |
|---|---|---|
| Non Government Organization (economic) | -0,041** (0,030) | - |
| Return on Assets | | 0,038 (0,266) |
| Debt Equity Ratio | | -0,100 (0,299) |
| Current Ratio | | -0,879** (0,036) |
| Constanta | 0,556 *** (0,025) | -62,89* (0,089) |

Source: Created by the Author

Table 14 presents the terms ***, **, and * that are significant at 1%, 5%, and 10%.

**Table 14. Endogeneity Test Results (PCN & ESG)**

| Variable | First Stage | Second Stage |
|---|---|---|
| Political Connection | -0,866 (0,776) | - |
| Environmen Social & Governance | | -0,001 * (0,061) |
| Regional Minimum Wage | 0,007*** (0,032) | - |
| Political Parties Represented in the Provincial Legislative Council | -1,297** (0,026) | - |
| Non Government Organization (economic) | -1,140** (0,035) | - |
| Return on Assets | | -4,430 (1,000) |
| Debt Equity Ratio | | -0,301 (0,711) |
| Current Ratio | | -6,760 (0,828) |
| Constanta | 0,556 *** (0,0025) | 325,3 (0,728) |

Source: Created by the Author

## CONCLUSSION

Summarizing the findings above, we confirm that the interaction among geopolitical risk, local political networks, and digital infrastructure complexly influences companies' ESG practices across sectors in Indonesia. Key findings indicate that geopolitical risk (GPR) significantly weakens ESG performance, although state-owned enterprises (SOEs) demonstrate relatively greater resilience, enabled by access to strategic resources. However, reliance on state policies actually increases vulnerability to political dynamics. Meanwhile, political connections do not significantly affect ESG performance, supporting our earlier assumption that collusion between economic and political actors is more oriented toward short-term profits than toward corporate sustainability.

On the other hand, digitalization plays a dual role: not only directly improving ESG performance but also serving as an effective moderating mechanism in mitigating the negative impact of GPR by increasing transparency and signaling trust to stakeholders. With a rigorous methodological approach, including dynamic panel analysis and endogeneity control through 2SLS, our study provides a robust empirical foundation for the critical role of digital transformation in strengthening ESG resilience amid geopolitical uncertainty.

As for academic implications, this study makes a theoretical contribution by expanding the literature on ESG and corporate resilience by integrating geopolitical and local political dimensions across sectors. Furthermore, this study introduces digital infrastructure as a critical moderating variable within the ESG framework, which has previously been studied primarily in the context of financial performance. Therefore, these findings also strengthen stakeholder theory by demonstrating that digitalization can serve as a tool to enhance accountability and reduce information asymmetry. Furthermore, methodologically, the use of the 2SLS instrument with regional political and economic variables provides a new approach to addressing endogeneity in ESG research.

From a practical perspective, this study emphasizes the importance of accelerating the adoption of digital technology to enhance ESG resilience while mitigating geopolitical risk. Investors are also advised to consider geopolitical exposure and the level of digitalization in ESG portfolio evaluations. For policymakers, the government should encourage investment in digital infrastructure as a strategic means to accelerate national sustainability and develop regulations that increase corporate political transparency to reduce distortions in ESG practices.

We acknowledge that this study has several limitations, including that the sample comprises only publicly listed companies on the Indonesia Stock Exchange (IDX), limiting generalizability to MSMEs or the informal sector. The measurement

p-ISSN:1411-6510
e-ISSN:2541-6111

of digitalization is still based on macro indicators, without accounting for qualitative aspects such as digital culture maturity. Furthermore, the study period (2016–2023) may not fully capture extreme geopolitical shocks, such as the Ukraine war or US-China tensions. Therefore, we strongly recommend further studies that explore the mechanisms of digitalization in greater depth, expand the sample size, and conduct cross-country comparisons across emerging markets with different geopolitical characteristics to enrich the findings. It seems that additional integration of socio-political variables, such as corporate culture or civil society pressure on ESG performance, could also provide a more holistic perspective. Thus, this study reaffirms that ESG resilience amid geopolitical turbulence depends not only on corporate policies but also on adaptive capacity enabled by digitalization.

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