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Environmental, Social, and Governance Practices as a Mediating Mechanism between Technology Organization Environment Factors and Sustainable Business Growth in Pharmaceutical Industry

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Abstract

Purpose - The study aims to examine the factors influencing the implementation of Environmental, Social, and Governance (ESG) practices and their impact on sustainable business growth (SBG). The factors analysed in this study are grounded in the Technology Organization Environment (TOE) framework, which includes ICT infrastructure, firm size, and competitive pressure as key dimensions influencing ESG implementation. In addition, this research incorporates ESG practices as a mediating construct to examine their indirect effects on the relationship between these factors and sustainable business growth. **Design/methodology/approach** - A quantitative research approach was adopted, and data were collected from 205 respondents through a self-administered questionnaire. The questionnaires were distributed using a convenience sampling technique via email and social media platforms, including a Google Forms online survey. The data were analysed using SPSS and SmartPLS software. **Findings** - The findings indicate that firm size and competitive pressure have a positive and significant influence on ESG practices, which in turn significantly enhance SBG. However, ICT infrastructure does not exhibit a significant effect on ESG practices or SBG. The results further confirm that ESG practices play a crucial mediating role in linking organizational and environmental factors to SBG. **Practical implications** - The study offers several practical implications for the pharmaceutical industry, business owners, and policymakers by enhancing understanding of how ESG practices can be effectively implemented to promote sustainable business growth. The findings provide contextual insights into the role of ESG practices in supporting long term growth and aligning business strategies with stakeholder expectations, particularly in emerging economies such as

Malaysia. **Originality/Value** - This study extends existing literature by applying the Technology Organization Environment framework to examine ESG practices and their mediating role in sustainable business growth within the pharmaceutical industry. The findings provide valuable guidance for improving key determinant factors related to ESG implementation and sustainability-oriented business performance.
Keywords: TOE Framework, ESG Practices, Sustainable Business Growth, Pharmaceutical Industry

Introduction

The contemporary business landscape is increasingly defined by a global imperative for sustainable development, compelling organizations to integrate environmental, social, and governance (ESG) considerations into their core strategies (Eccles et al., 2014; Liang et al., 2022). This profound shift reflects a growing recognition that long-term economic success, often termed Sustainable Business Growth (SBG), is inextricably linked to responsible corporate conduct and the creation of shared value for all stakeholders (Elkington, 1997; Schaltegger & Wagner, 2011). ESG practices have thus transitioned from peripheral concerns to critical metrics for evaluating a company's viability, resilience, and ethical standing, driven by escalating pressures from regulatory bodies, institutional investors, and civil society (Fabrizi et al., 2022; Gillan et al., 2021). Illustratively, legislative frameworks such as the European Union's Corporate Sustainability Reporting Directive (CSRD) mandate stringent ESG disclosures, underscoring the global movement towards greater accountability and transparency in corporate sustainability reporting (Feijao, 2021).

Within this evolving paradigm, the pharmaceutical industry occupies a unique and critical position. As a sector fundamental to public health and well-being, it faces intense scrutiny regarding its ethical, social, and environmental footprint (Berg et al., 2022). Pharmaceutical operations are inherently resource-intensive, characterized by complex global supply chains, significant energy consumption, waste generation from manufacturing processes, and substantial research and development (R&D) investments (Belal et al., 2025). While these characteristics present considerable challenges for comprehensive ESG integration, they also offer substantial opportunities for enhancing corporate reputation, optimizing operational efficiency, mitigating regulatory and reputational risks, and fostering long-term profitability through effective ESG implementation (Hahn et al., 2015; Porter & Kramer, 2006). Despite these potential benefits, the pharmaceutical industry has historically lagged in fully embracing comprehensive ESG principles compared to other sectors (Deloitte, 2020; KPMG, 2021). Barriers such as high implementation costs, the complexity of global regulatory compliance, the long R&D cycles, and the need for specialized expertise often hinder progress in this sector (Li & Wang, 2022).

To systematically analyze the factors influencing the adoption of ESG practices and their subsequent impact on SBG within the pharmaceutical sector, this study employs the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990). The TOE framework provides a robust theoretical lens for examining how technological readiness (e.g., green manufacturing innovations, digital tools for sustainability reporting), organizational capacity (e.g., leadership commitment, employee engagement, financial resources), and external environmental pressures (e.g., regulatory mandates, stakeholder expectations, competitive dynamics) collectively shape a firm's strategic decisions regarding

ESG integration (Aboelmaged, 2018; Baker, 2012). By applying this framework, the research aims to elucidate the intricate interplay between these contextual factors and the effective implementation of ESG initiatives, ultimately contributing to sustainable business outcomes.

While the strategic importance of ESG for SBG is increasingly acknowledged across various industries, there remains a notable gap in understanding the specific drivers and mechanisms through which ESG practices contribute to sustainable growth within the highly regulated and specialized pharmaceutical industry (Dyllick & Hockerts, 2002). Existing literature often provides a broad overview of ESG benefits but lacks granular insights into how firm-level technological, organizational, and environmental factors, as conceptualized by the TOE framework, specifically facilitate or impede ESG adoption and its ultimate impact on SBG in this critical sector. Moreover, research on these dynamics in emerging economies, such as Malaysia, is particularly scarce. This study seeks to address this lacuna by providing empirical evidence on these relationships, thereby offering actionable insights for pharmaceutical firms striving to achieve both economic prosperity and responsible stewardship, aligning with the principles of strategic quality orientation and sustainable performance (Khan & Naeem, 2018).

The remainder of this paper is structured as follows: Section 2 presents a comprehensive review of the existing literature on ESG practices, SBG, and the TOE framework, developing the theoretical underpinnings for the proposed hypotheses. Section 3 details the research methodology, including data collection procedures and analytical techniques. Section 4 presents the empirical findings. Section 5 discusses these findings in relation to the theoretical framework and prior research, outlines the study's implications, acknowledges its limitations, and suggests avenues for future research.

Literature Review

Sustainable Business Growth (SBG) extends the traditional concept of business growth by integrating environmental and social considerations alongside economic objectives, moving beyond a singular focus on profit maximization (Elkington, 1997; Dyllick & Hockerts, 2002). It represents a holistic approach where companies pursue profitability and expansion in a manner that preserves natural resources, promotes social equity, and ensures long-term viability for all stakeholders, including future generations (Schaltegger & Wagner, 2011). SBG is not merely about achieving financial targets but about creating enduring value that benefits society and the environment, thereby securing future opportunities for the business itself and contributing to a more sustainable global economy (Bansal & Roth, 2000; Khan & Naeem, 2018). This involves balancing economic prosperity with ecological integrity and social responsibility, moving beyond short-term gains to foster resilience, adaptability, and innovation in a dynamic global context (Fabrizi et al., 2022; Porter & Kramer, 2006).

Key characteristics of SBG include a commitment to resource efficiency, the adoption of circular economy principles, ethical and transparent supply chain management, and proactive stakeholder engagement (Khan & Naeem, 2018). Companies pursuing SBG often invest in renewable energy sources, sustainable materials, and responsible waste management practices to minimize their environmental footprint and enhance operational efficiency (Sarkis et al., 2010). Socially, they prioritize fair labor practices, diversity and inclusion, community development, and transparent communication with customers and employees, building social capital and enhancing brand loyalty (Carroll, 1991). From a governance perspective, SBG

necessitates robust ethical frameworks, accountability mechanisms, and long-term strategic planning that integrates sustainability at every level of decision-making, ensuring that economic growth does not come at the expense of environmental or social well-being (Aguilera et al., 2006; Liang et al., 2022).

The pharmaceutical industry, with its critical role in public health, has a unique responsibility and opportunity to pursue SBG (Berg et al., 2022). This involves not only developing life-saving medications but also ensuring that these products are produced, distributed, and consumed in an environmentally and socially responsible manner throughout their lifecycle (Riikonen et al., 2024). For pharmaceutical firms, SBG can manifest through innovations in green chemistry, reducing the environmental impact of manufacturing processes, ensuring equitable access to medicines, and maintaining the highest ethical standards in research, development, and marketing (Porter & Kramer, 2006; Li & Wang, 2022). By embracing SBG, pharmaceutical companies can enhance their reputation, attract socially conscious investors, comply with evolving regulations, and ultimately secure their long-term success in a world increasingly demanding corporate responsibility and sustainable value creation (Fabrizi et al., 2022; Khan & Naeem, 2018).

The Technology-Organization-Environment (TOE) framework provides a comprehensive lens for understanding the factors influencing ESG implementation. According to Aboelmaged (2018), technological readiness, organizational capacity, and environmental pressures collectively determine a firm's ability to integrate ESG practices. Technological factors, such as the adoption of advanced technologies like green manufacturing processes and energy-efficient systems, play a crucial role in facilitating environmental compliance and reducing resource consumption in pharmaceutical production. By leveraging these technologies, firms can achieve operational efficiency while aligning with sustainability goals. Organizational factors, including leadership commitment, corporate governance structures, and employee capabilities, are equally critical for driving ESG adoption (Rehman et al., 2024). A strong organizational focus on ethical R&D practices, supply chain transparency, and regulatory compliance ensures that companies can balance environmental responsibility with sustainable growth. Additionally, environmental factors such as regulatory mandates, stakeholder expectations, and societal pressures significantly influence ESG adoption (Rehman et al., 2023). For pharmaceutical companies, meeting environmental standards and addressing public health concerns are essential drivers of sustainable business growth. Liu et al. (2025) emphasized that ESG integration not only aligns with ethical imperatives but also serves as a strategic driver for corporate performance and resilience. Aligning ESG initiatives with organizational strategies fosters long-term sustainability and competitive advantage while ensuring compliance with global sustainability agendas. Despite its benefits, ESG implementation in the pharmaceutical industry faces notable challenges. Berg et al. (2022) highlighted inconsistencies in ESG measurement, which hinder benchmarking and progress tracking. Furthermore, Kathan et al. (2025) emphasized the risks of "greenwashing," where firms claim to meet sustainability goals without measurable evidence. Mainly happen during CSR reporting (Ganesan et al., 2019; Ganesan et al., 2013). Addressing these challenges through accurate reporting, measurable targets, and transparent governance is essential for pharmaceutical companies to manage reputational risks and achieve sustainable growth. This study contributes to the existing literature by integrating ESG practices within the Technology-Organization- Environment (TOE) framework to examine their impact on sustainable business

growth (SBG). While previous research has explored ESG adoption, limited studies have analysed its mediating role in the relationship between TOE elements and SBG, particularly in the pharmaceutical sector in Malaysia. This research addresses this gap by identifying key determinants of ESG practices and evaluating their indirect effect on business sustainability.

Theoretical Framework

The implementation of Environmental, Social, and Governance practices in the pharmaceutical industry is examined using the Technology Organization Environment framework proposed by Tornatzky and Fleischer (1990), which provides a systematic lens for analysing how technological capabilities, organizational characteristics, and environmental conditions influence ESG adoption and sustainable business growth. The technological context captures ICT infrastructure and digital capabilities that support ESG initiatives, the organizational context reflects firm size, governance structures, and resource availability that enable effective ESG integration, and the environmental context encompasses regulatory requirements, stakeholder expectations, and competitive pressures that motivate ESG adoption and compliance. Building on this framework, the study assesses the combined effects of these factors on sustainable business growth and examines the mediating role of ESG in linking these determinants to firm performance. Prior studies, including Aboelmaged (2018), Li and Wang (2022), and Hahn et al. (2015), confirmed the suitability of the Technology Organization Environment framework for analysing ESG implementation and highlighted its relevance in enhancing corporate resilience, regulatory alignment, and competitive advantage in the pharmaceutical sector.

Research Theoretical Mode

Figure 1 demonstrates the proposed research model for this study based on a review of the literature. This framework has been further modified to suit the concept of the present study. The Technology Organization Environment framework was selected over Stakeholder Theory and Institutional Theory because it provides a structured approach to analysing technological, organizational, and environmental factors influencing ESG implementation. While Stakeholder Theory focuses on the role of various stakeholders in sustainability adoption, it lacks a systematic framework for assessing technological readiness and firm-specific capabilities. Similarly, Institutional Theory emphasizes external pressures but does not sufficiently address internal organizational readiness. The Technology Organization Environment framework effectively captures both internal and external influences on ESG adoption, making it a suitable model for this study. The three Technology Organization Environment elements, namely ICT infrastructure representing the technological context, firm size representing the organizational context, and competitive pressure representing the environmental context, were chosen because they directly impact a firm’s ability to integrate ESG practices.

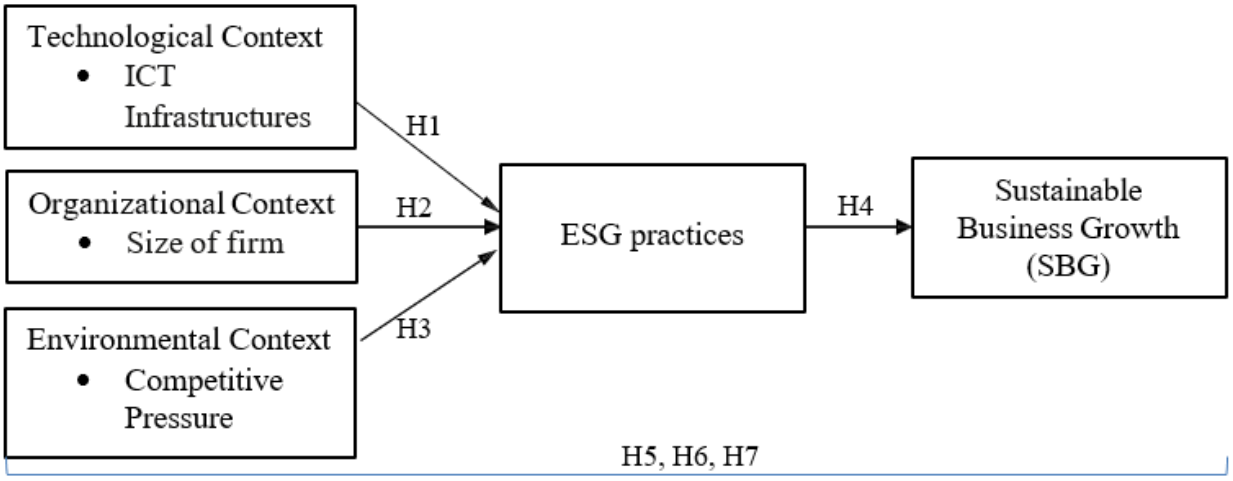

Figure 1: Research Framework

Hypotheses Development

This section develops the hypotheses linking the technological, organizational, and environmental contexts of the TOE framework to ESG practices, and subsequently to Sustainable Business Growth (SBG). It also posits the mediating role of ESG practices, drawing upon established and recent literature to provide robust theoretical justification for each relationship.

ICT Infrastructures and ESG Practices

The technological context, particularly the availability and utilization of advanced Information and Communication Technology (ICT) infrastructure, is hypothesized to play a crucial role in facilitating the adoption and implementation of ESG practices within organizations. A robust ICT infrastructure enables firms to collect, process, and analyze vast amounts of data related to environmental performance, social impact, and governance metrics, which is fundamental for effective sustainability management and transparent reporting (Aboelmaged, 2018; Zhu et al., 2006). This capability is essential for transparent reporting, identifying areas for improvement, and implementing efficient resource management systems, such as energy management platforms or waste reduction tracking tools (Sarkis et al., 2010). For instance, technology-driven solutions enable real-time monitoring, predictive analytics, and data-driven decision-making, allowing pharmaceutical enterprises to reduce resource wastage, minimize environmental impacts, and improve their overall sustainability performance (Mousa et al., 2025). Furthermore, ICT can enhance internal communication and collaboration across different departments and with external stakeholders, which is vital for coordinating complex ESG initiatives and ensuring accountability (Li & Wang, 2022). Therefore, firms with advanced ICT infrastructure are better equipped to integrate and manage comprehensive ESG practices effectively. By addressing key factors such as environmental inputs, carbon emissions, natural resource consumption, and green technology adoption, ICT-driven ESG initiatives empower pharmaceutical firms to not only mitigate pollution but also create long-term environmental and economic value. These practices ultimately contribute to sustainable business growth while aligning the industry with global efforts to combat climate change and promote environmental stewardship. By integrating low-carbon technologies and renewable energy, businesses can optimize resource efficiency while meeting regulatory and market expectations. Based on this, it is proposed that:

H1: *ICT Infrastructures positively affect the implementation of ESG practices.*

Size of Firm and ESG Practices

The organizational context, particularly firm size, is a significant determinant of a company's capacity and propensity to adopt ESG practices. Larger firms typically possess greater financial resources, human capital, and more formalized organizational structures that can support the substantial investment and complex implementation required for comprehensive ESG initiatives (Fabrizi et al., 2022; Grewal et al., 2016). They often have dedicated departments or personnel responsible for sustainability, allowing for more systematic planning, execution, and monitoring of ESG strategies (Hahn et al., 2015; Liang et al., 2022). Additionally, larger pharmaceutical firms face greater scrutiny from investors, policymakers, and consumers, which incentivizes them to integrate comprehensive ESG strategies into their business models to maintain legitimacy and attract capital (Gillan et al., 2021; Aguilera et al., 2006). Conversely, smaller firms may face resource constraints, lack specialized expertise, and have less formalized processes, which can hinder their ability to navigate the complexities of ESG reporting and implementation, though some prioritize localized social contributions and employee well-being (KPMG, 2021; Setyaningsih et al., 2024). Based on this, it is proposed that:

H2: *Size of Firm positively affect the implementation of ESG practices.*

Competitive Pressure and ESG Practices

The environmental context, specifically competitive pressure, is a powerful external driver for the adoption of ESG practices. In competitive markets, firms are often compelled to differentiate themselves and respond to evolving customer, investor, and regulatory demands to maintain their market position (Porter & Kramer, 2006). As sustainability becomes a key concern for consumers, investors, and business partners, companies face increasing pressure to demonstrate their commitment to ESG principles to maintain or gain market share and attract socially responsible investments (Friede et al., 2015). Competitors adopting sustainable practices can create a benchmark, pushing other firms to follow suit to avoid being perceived as laggards or losing their competitive edge (Flammer, 2013; Li & Wang, 2022). This competitive dynamic can accelerate the integration of ESG considerations into core business strategies, as firms seek to enhance their brand image, attract talent, and comply with emerging industry standards and best practices, ultimately contributing to their strategic quality orientation (Khan & Naeem, 2018). Based on this, it is proposed that:

H3: *Competitive Pressure positively affect the implementation of ESG practices.*

ESG Practices and Sustainable Business Growth (SBG)

ESG practices are hypothesized to directly contribute to Sustainable Business Growth (SBG). By integrating environmental, social, and governance considerations into their operations, firms can achieve a range of benefits that foster long-term growth, resilience, and competitive advantage (Elkington, 1997). Environmentally responsible practices can lead to significant operational efficiencies through reduced resource consumption, waste minimization, and lower energy costs, thereby enhancing profitability and reducing environmental liabilities (Sarkis et al., 2010). Strong social performance can improve employee morale, productivity, and retention, attract and retain top talent, and build stronger relationships with customers and communities, thereby expanding market opportunities and enhancing brand value (Carroll, 1991; Lee et al., 2025). Robust governance frameworks enhance transparency,

reduce risks of fraud and corruption, improve decision-making processes, and foster greater investor confidence and access to capital (Aguilera et al., 2006; Fabrizi et al., 2022). Collectively, these benefits contribute to a more stable, reputable, innovative, and resilient business model, which is essential for sustained and responsible growth, aligning with the principles of strategic quality orientation (Khan & Naeem, 2018; Porter & Kramer, 2006; Liang et al., 2022). By integrating ESG practices, pharmaceutical companies can optimize resource efficiency, enhance operational resilience, and position themselves as leaders in sustainability. These practices not only meet evolving stakeholder expectations but also drive innovation and long-term growth in an increasingly sustainability-conscious global economy. Based on this, it is proposed that:

H4: *ESG practices positively affect sustainable business growth (SBG).*

ESG Practices as a Mediator: ICT Infrastructures to SBG

Technological advancements play a crucial role in shaping ESG practices, which in turn drive sustainable business growth. Cheng et al. (2024) argued that technological innovations help businesses meet market expectations while reducing their environmental footprint. When technology leads to the implementation of ESG practices, firms are better positioned to achieve sustainable business growth. ICT infrastructure plays a pivotal role in shaping ESG practices, particularly within the pharmaceutical industry, where innovation is critical to meeting stakeholder expectations and driving sustainable business growth. Gong et al. (2024) asserted that technological innovations enable firms to align their operations with market demands while simultaneously reducing their environmental footprint. In the pharmaceutical sector, such advancements include green manufacturing processes, energy-efficient production systems, and the use of data-driven technologies to enhance operational efficiency and transparency. When technological innovation facilitates the implementation of ESG practices, firms are better positioned to achieve long-term sustainability. Khan and Naeem (2018) highlighted that strategic quality orientation, supported by innovation capabilities, plays a significant role in fostering sustainable growth by enhancing efficiency and meeting both social and environmental obligations. Pharmaceutical companies leveraging advanced technologies to optimize their supply chains, improve product accessibility, and ensure ethical governance are able to outperform competitors while addressing global sustainability challenges. By integrating ESG practices through technology, pharmaceutical firms not only mitigate risks but also unlock opportunities for innovation and long-term value creation. These practices help firms achieve sustainable business growth while reinforcing their commitment to environmental stewardship, social responsibility, and governance excellence.

H5: *ESG practices mediate the relationship ICT Infrastructures and sustainable business growth (SBG).*

ESG Practices as a Mediator: Size of Firm to SBG

The study by Li and Wang (2022) highlighted the importance of organizational readiness in adopting and implementing ESG practices effectively. Governance structures and resource allocation are key enablers of social sustainability, which contribute to long-term sustainable business performance. Li and Wang (2022) emphasized that the size of a firm significantly influences its organizational readiness to adopt and implement ESG practices effectively. Larger pharmaceutical firms often have more robust governance structures and greater resource allocation capabilities, enabling them to integrate ESG practices across their

operations and scale sustainability initiatives. These firms benefit from established frameworks for addressing social sustainability, which contribute to long- term business performance and resilience (Ganesan et al., 2024). In contrast, smaller pharmaceutical firms, while often facing resource constraints, can leverage their agility to implement ESG practices more swiftly in specific operational areas. Khan and Naeem (2018) highlighted that strategic quality orientation and innovation capabilities are crucial for fostering sustainable growth, particularly for smaller firms seeking to compete in a highly regulated and competitive market. By focusing on targeted ESG initiatives, such as employee welfare or localized environmental programs, smaller firms can align with sustainability goals while maximizing their resource efficiency. Regardless of size, the effective implementation of ESG practices requires readiness and commitment at the organizational level. Governance structures, resource allocation, and stakeholder engagement are key enablers that help pharmaceutical companies navigate the complexities of ESG integration. Firms of all sizes that prioritize these factors are better positioned to achieve long-term sustainable business growth while contributing to environmental stewardship, social responsibility, and governance excellence (Li and Wang, 2022; Khan and Naeem, 2018). Based on this, it is proposed that:

H6: *ESG practices mediate the relationship between size of firm and sustainable business growth (SBG).*

ESG Practices as a Mediator: Competitive Pressure to SBG

Regulatory pressures and market dynamics play a significant role in shaping ESG adoption. Freeman (2010) emphasized that engaging diverse stakeholders to address environmental concerns is critical for driving sustainable business growth. ESG practices not only help meet these external pressures but also create opportunities for long-term growth. Competitive pressure plays a significant role in shaping the adoption of ESG practices within the pharmaceutical industry. Freeman (2010) emphasized that engaging diverse stakeholders to address environmental concerns is critical for driving sustainable business growth, especially in industries facing intense competition. In the pharmaceutical sector, the pressure to innovate while adhering to strict environmental, social, and governance standards forces companies to integrate ESG practices as a strategic necessity rather than just compliance. As competition intensifies, pharmaceutical firms that adopt ESG practices can differentiate themselves by demonstrating commitment to sustainability, thereby meeting stakeholder expectations and enhancing their brand reputation. Khan and Naeem (2018) highlighted that strategic quality orientation, supported by robust innovation capabilities, positions firms to respond effectively to competitive pressures, ensuring not only compliance but also leadership in sustainability. By addressing ESG concerns, pharmaceutical firms can not only meet regulatory and market demands but also create opportunities for long-term growth. Competitive pressure thus drives pharmaceutical firms to innovate and optimize their ESG practices, using them as tools for gaining a competitive edge. Companies that prioritize sustainability are better equipped to attract investors, customers, and talent, all of which contribute to sustainable business growth. These firms are well-positioned to succeed in a market where long- term profitability increasingly depends on meeting both environmental and social expectations (Freeman, 2010; Khan and Naeem, 2018). Based on this, it is proposed that:

H7: *ESG practices mediate the relationship between competitive pressure and sustainable business growth (SBG).*

Research Methodology

Data Collection Procedure and Sampling

The study conducted uses a quantitative method where a cross-sectional survey research design is applied to collect the data. Data collection is collected through a self-administered questionnaire. There are three sections in the proposed questionnaire. Section 1 represents company profile data such as status of implementation of ESG practices, location, firm's industry, firm's age, and size of firm. Section 2 captures the respondents' profile, including demographic details such as gender, race, age, academic qualification, current position, and working experience. Sections 3 to 5 of the questionnaire measure the independent variables under the TOE framework, including technological context (ICT infrastructure), organizational context (size of the firm), environmental context (competitive pressure), and their direct effects on ESG practices. Section 6 of the questionnaire measures ESG practices as the mediator, focusing on the implementation of ESG practices within the firm. Whereas Section C measures the dependent variable of the study, which is sustainable business growth (SBG) influenced by the implementation of ESG practices in the pharmaceutical industry. The study population comprises pharmaceutical companies operating in Malaysia. The sampling frame includes businesses engaged in ESG implementation, considering both firms currently practicing ESG and those planning to adopt sustainability initiatives. A total of 205 companies participated in the study, selected through a convenience sampling method to ensure diverse industry representation. All the data collected is used to test the cause-and-effect relationship among the study variables. Since this study explores the impact of ESG practices on sustainable business growth in the pharmaceutical industry, it is considered an exploratory study. The subject population consists of companies in the pharmaceutical industry in Malaysia, with the unit of analysis at the company level. The study employs a convenience sampling method for data collection, and Google Forms is used as the platform for administering the survey. Data collection was conducted using an online questionnaire distributed via email and social media platforms. The survey was structured to capture firm demographics, ESG adoption status, and perceptions of TOE-related factors. Respondents were selected based on their role within the company to ensure they had sufficient knowledge of their firm's sustainability practices. A total of 205 respondents participated in the online questionnaire, and their responses were used in the data analysis section. This indicates that the number surpasses the minimum sample size requirement. Respondents were selected based on their involvement in ESG-related activities within their firms. Managers, supervisors, and executives were targeted to ensure informed responses regarding ESG practices, corporate policies, and business sustainability strategies. Among the 205 surveyed companies, 93 firms actively implement ESG practices, 67 are in the process of adopting ESG, and 42 do not currently practice ESG. The analysis primarily focuses on the 93 companies already implementing ESG, as their responses provide direct insights into the impact of sustainability initiatives on business growth. However, comparative insights from non- adopters are also considered to highlight industry trends and challenges in ESG adoption.

Measures

Questionnaire items were adapted from previously established scales: Eleven questions were adapted from (Addy et al., 2024) to measure the TOE framework, covering technological context (ICT infrastructure), organizational context (size of the firm), and environmental context (competitive pressure). Nine items were derived from Liang et al. (2022) to assess the implementation of Environmental, Social, and Governance (ESG) practices within the

pharmaceutical industry. Additionally, eleven questions were sourced from Khan and Naeem (2018) to evaluate sustainable business growth (SBG). A five-point Likert scale was employed to measure the questionnaire items, with response options ranging from (1) "strongly disagree," (2) "disagree," (3) "neutral," (4) "agree," to (5) "strongly agree." Table 1 shows that the questionnaire consisted of a total of 31 items designed to measure the study variables comprehensively.

Table 1
Measurement of Items

Variables	No	Items	Source (Adapted)
ICT Infrastructure	**ICT1**	My firm provides sufficient internet access for employees to engage in ESG initiatives.	(Addy et al., 2024)
	ICT2	My firm has a sufficient number of computers or systems online to effectively monitor ESG activities.	
	ICT3	My firm provides enough computers for employees to work on ESG-related tasks effectively.	
Size of Firm	**SOF1**	My firm allocates sufficient resources to implement ESG practices effectively.	(Addy et al., 2024)
	SOF2	Employees in my firm have the necessary skills and experience to support ESG initiatives.	
	SOF3	My firm is resilient in maintaining ESG practices during operational or economic challenges.	
	SOF4	My firm can quickly adapt operations to align with ESG practices.	
Competitive Pressure	**CP1**	Implementing ESG practices is essential for my firm to remain operationally competitive.	(Addy et al., 2024)
	CP2	Implementing ESG practices is critical for achieving my firm's long-term strategic goals.	
	CP3	My firm's implementation of ESG practices is influenced by the expectations or requirements of vendors and third-party partners.	
	CP4	My firm feels competitive pressure to implement ESG practices because our competitors are practising them.	
	ESG1	My firm actively implements environmental management initiatives and executes action plans	
	ESG2	My firm regularly conducts environmental performance evaluations and audits to measure the effectiveness of ESG practices.	

ESG Practices	**ESG3**	My firm actively supports environmental protection activities initiated by stakeholders.	Liang et al. (2022)
	ESG4	My firm actively carries out initiatives to ensure consumer protection.	
	ESG5	My firm consistently undertakes actions to improve the working environment for employees.	
	ESG6	My firm actively engages in collaborative activities with competitors and partners to promote mutual benefits.	
	ESG7	My firm has implemented processes to guarantee shareholders' rights.	
	ESG8	My firm has established independent audit mechanisms, both internal and external, and monitors them regularly.	
	ESG9	My firm listens to opinions from stakeholders and markets and incorporates them into management decisions.	
Sustainable Business Growth (SBG)	**SBG1**	There is a high revenue growth.	Khan and Naeem (2018)
	SBG2	There is a high profitability growth.	
	SBG3	There is an improvement in terms of sales and market share.	
	SBG4	There is an increase in the number of customers.	
	SBG5	There is an improvement in training and skills development.	
	SBG6	There is an improvement in corporate social investment contribution.	
	SBG7	There is an improvement in product image.	
	SBG8	There is an increase in the number of permanent employees.	
	SBG9	We comply to relevant environmental laws and regulations.	
	SBG10	We follow and implement environmental policies and procedures.	
	SBG11	We focus on reducing energy consumption.	

Results

Demographic Profile

The demographic profile of the respondents in this study was based on 205 responses. In terms of gender, 62.4% of the respondents were male, while 37.6% were female. Regarding ethnicity, the majority were Indian (41.0%), followed by Chinese (39.0%) and Malay (20.0%). In terms of age, 49.8% of respondents were between 41 and 50 years old, 35.1% were between 31 and 40 years old, with the remaining respondents aged 51 years and above (13.7%) or between 21 and 30 years (1.0%). For academic qualifications, 53.7% held a Bachelor's degree, followed by 25.4% with a Diploma, 16.6% with a Master's degree, and 2.4% with SPM qualifications. In terms of employment role, 35.1% were Managers, 23.4% were Staff members, 19.0% were Supervisors, and 13.7% were Executives, with the remaining

respondents in administrative or senior leadership positions. Regarding years of working experience, 47.3% of the respondents had between 6 and 10 years of experience, 23.9% had 2 to 5 years, and 20.0% had between 11 and 15 years. The demographic profile focuses on individual respondents rather than the firm because employees at various levels provide valuable insights into ESG implementation. While the unit of analysis is the organization, collecting individual-level data helps assess employee perceptions of sustainability practices within their firms. The data reflects a diverse demographic composition, enhancing the reliability of the study's findings in understanding the factors that influence sustainable business growth in the pharmaceutical industry.

Descriptive Statistic Analysis

The descriptive statistics for this study were derived using SPSS Statistics Software, focusing on the mean and standard deviation for 205 responses. Table 2 summarizes the findings for the constructs of ICT Infrastructure (ICT), Size of Firm (SOF), Competitive Pressure (CP), Environmental, Social, and Governance practices (ESG), and Sustainable Business Growth (SBG). According to the interpretation guidelines (Sekaran & Bougie, 2013), a mean value below 3 indicates low agreement, 3 to 5 is moderate, and above 5 is high. The results revealed that the highest mean was for SBG with a value of 4.259, indicating a strong agreement among respondents about the sustainable business growth achieved. The lowest mean was for ICT at 3.657, which still reflects moderate agreement. In terms of variability, ICT displayed the highest standard deviation of 0.830, suggesting relatively diverse responses regarding ICT Infrastructure. Conversely, SBG had the lowest standard deviation of 0.722, reflecting more consistent responses about sustainable business growth. To address the potential for Common Method Variance (CMV) in this self-report survey, Harman's single-factor test was employed. Exploratory Factor Analysis (EFA) with all items constrained to one factor revealed that a single factor accounted for 42.86% of the total variance. This value is below the 50% threshold, indicating that CMV was not a significant issue in this study (Tehseen et al., 2017; Podsakoff et al., 2003).

Table 2
Descriptive Statistics

Constructs	Mean	Standard Deviation
ICT Infrastructure (Technological)	3.657	0.830
Size of Firm (Organizational)	3.875	0.831
Competitive Pressure (Environmental)	3.935	0.875
ESG practices	4.093	0.841
Sustainable Business Growth (SBG)	4.259	0.722

Measurement Model

To test the reflective construct measurement model, this work includes internal reliability, convergent validity, and discriminating criteria for validity. According to Hair Jr et al. (2017) and Krishnasamy, Ganesan, Shaharudin, (2025)., the model consists of the Average Variance Extracted (AVE), Factor Loading (FL), as well as Composite Reliability (CR) for this study.

Table 3
Measurement Model

Constructs	Items	Factor Loadings	CR	AVE
ICT Infrastructure (Technological)	TOE(T)1	0.862	0.911	0.772
	TOE(T)2	0.887		
	TOE(T)3	0.887		
Size of Firm (Organizational)	TOE(O)1	0.793	0.911	0.719
	TOE(O)2	0.887		
	TOE(O)3	0.861		
	TOE(O)4	0.847		
Competitive Pressure (Environmental)	TOE(E)1	0.821	0.875	0.637
	TOE(E)2	0.833		
	TOE(E)3	0.763		
	TOE(E)4	0.772		
ESG practices	ESG1	0.791	0.944	0.652
	ESG2	0.806		
	ESG3	0.846		
	ESG4	0.797		
	ESG5	0.806		
	ESG6	0.820		
	ESG7	0.855		
	ESG8	0.761		
	ESG9	0.781		
Sustainable Development Business (SBG)	SBG1	0.729	0.938	0.578
	SBG2	0.715		
	SBG3	0.735		
	SBG4	0.727		
	SBG5	0.811		
	SBG6	0.789		
	SBG7	0.781		
	SBG8	0.753		
	SBG9	0.771		
	SBG10	0.780		
	SBG11	0.767		

Notes: CR: Composite Reliability; AVE: Average Variance Extracted

Based on the results from Table 3, the composite reliability (CR) values ranged between 0.875 and 0.944**,** exceeding the minimum threshold of 0.70, as suggested by Hair Jr. et al. (2017). These findings indicate robust internal consistency reliability for all constructs in the study. Additionally, the average variance extracted (AVE) was used to evaluate convergent validity. The AVE values for all constructs ranged from 0.578 to 0.772, surpassing the minimum requirement of 0.50, which confirms good convergent validity.

Furthermore, the standardized loadings for the items in this study ranged from 0.715 to 0.887, all of which are above the minimum cut-off score of 0.70, indicating strong internal reliability for the individual items. These results demonstrate that the constructs in this study are reliable and valid, providing a solid foundation for subsequent analyses.

Table 4
Discriminant validity (HTMT)

	ɔmpetitive Pressure	ESG practices	ICT Infrastructure	SBG	ɨize of Firm
Competitive Pressure					
ESG practices	0.794				
ICT Infrastructure	0.722	0.567			
SBG	0.598	0.791	0.451		
Size of Firm	0.819	0.818	0.813	0.662	

Notes: ICT Infrastructure, (Technological); Size of Firm, (Organizational); Competitive Pressure, (Environmental); ESG practices, (Environmental, Social and Governance Practices); SBG, (Sustainable Business Growth)

Based on the results from Table 4: Discriminant Validity (HTMT)**,** the discriminant validity was assessed using the HTMT (Heterotrait-Monotrait) ratio of correlations**,** as recommended by Henseler et al. (2015) and Krishnasamy et al (2025). According to Franke and Sarstedt (2019), a strong relationship between constructs is indicated when the HTMT value is below 0.90**,** reflecting good correlations. The results of this study show that all constructs have positive relationships, with the HTMT values well below 0.90**,** demonstrating satisfactory discriminant validity. Additionally, to further confirm discriminant validity, the Average Variance Extracted (AVE) for each construct was compared to the correlation values. The AVE for all constructs exceeds the correlation values, fulfilling the Fornell and Larcker (1981) criterion for discriminant validity. This ensures that each construct is sufficiently distinct from the others. In conclusion, the measurement model exhibits adequate reliability and validity, and therefore, the model is deemed appropriate for testing the hypotheses in this study.

Structural Model

Lateral Collinearity Assessment

The purpose of the Lateral Collinearity Assessment is to detect any potential lateral collinearity issues. According to Hair Jr. et al. (2019), the Variance Inflation Factor (VIF) should be less than or equal to 5 to be considered acceptable. If the VIF exceeds 5, it indicates that the independent variables in the model are highly correlated, which could lead to problems in model fitting and result interpretation. The results shown in Table 5: Result of Collinearity indicate that the VIF for all independent variables is below 5, suggesting that lateral multicollinearity is not a concern in this study.

Table 5
Result of Collinearity

Dependent Variable	Independent Variable	VIF
ESG practices	ICT Infrastructure (Technological)	2.044
ESG practices	Size of Firm (Organizational)	2.528
ESG practices	Competitive Pressure (Environmental)	2.009
Sustainable Business growth (SBG)	ESG practices	1.000

Significance of Path Coefficients

The standard regression coefficient (or path coefficient, β) was used to analyze the direct impact of one construct (independent variable) on another construct (dependent variable).

The magnitude of the coefficient reflects the strength and direction of the relationship. A stronger relationship indicates a higher effect. Path coefficient tools were utilized to test the relationships and directions of the hypotheses proposed in this study. According to Anderson and Gerbing (1988), a completely collinear relationship is acknowledged when the value of the correlation coefficient is 1. Upon validating the model, the hypotheses were tested and confirmed. The coefficient of determination (R^2) is used to assess the explanatory power of the model. In this study, the R^2 value for Sustainable Business Growth (SBG) is 0.546, indicating that 54.6% of the variance in SBG can be explained by the predictors (ICT infrastructure, size of the firm, competitive pressure, and ESG practices). Additionally, the R^2 value for ESG practices is 0.618, meaning that 61.8% of its variance is explained by the independent variables. According to Cohen (2013), the effect size (f^2) is categorized as small (0.02), medium (0.15), or large (0.35). The results indicate that ESG practices have a large effect on SBG (f^2 = 1.204), while other constructs have smaller or medium effects. The detailed results are summarized in Table 6. Moreover, the predictive relevance (Q^2)was evaluated using the blindfolding method in SmartPLS. According to Henseler et al. (2015), the Q^2 value should exceed zero to confirm predictive validity. The analysis revealed a Q^2 value of 0.366 for SBG and 0.154 for ESG practices, indicating satisfactory predictive relevance for the model.

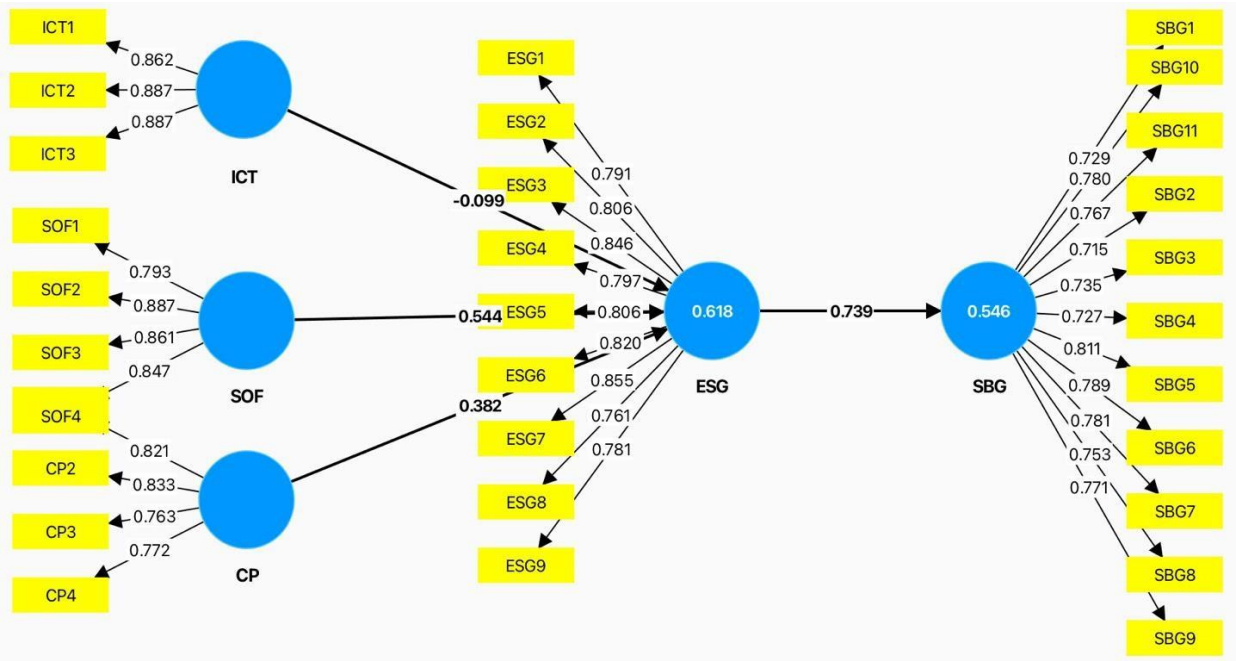

Figure 2: PLS Structure Model

Table 6
Path Coefficients and Hypothesis Testing

Hypotheses	Relationship	Std. Beta	Std. Dev	t- value	P-value	Decision	R2	f2	Q2
H1	ICT > ESG	-0.099	0.074	1.347	0.089	NS	0.618	0.013	0.601
H2	SOF>ESG	0.544	0.073	7.438	0.000	S		0.306	
H3	CP>ESG	0.382	0.074	5.177	0.000	S		0.191	
H4	ESG>SBG	0.739	0.041	18.224	0.000	S	0.546	0.404	0.366

Notes: ICT Infrastructure, (Technological); Size of Firm, (Organizational); Competitive Pressure, (Environmental); ESG practices, (Environmental, Social and Governance Practices); SBG, (Sustainable Business Growth); S = Supported; NS = Not Supported

For the current study, four direct hypotheses between the variables are recognized. To identify the t-values significant level, it can be calculated using a bootstrapping function in SmartPLS software. Based on the samples, a one-tailed test and a significance level of 0.05 was discovered, referred to assessment of the path coefficients as revealed in Table 6. The results indicate that hypotheses are considered significant at the 0.05 level when the t-values are ≥ 1.645. For H1(ICT > ESG), the relationship was not significant, with a t-value of 1.347**,** which is below the threshold, indicating that ICT infrastructure does not significantly influence ESG practices. In contrast, H2 (Size of Firm > ESG) was supported, with a t-value of 7.438, confirming that the size of the firm significantly influences ESG adoption. Similarly, H3(Competitive Pressure > ESG) demonstrated significance, with a t-value of 5.177, highlighting that competitive pressure positively impacts ESG practices. For H4 (ESG > SBG), the analysis revealed a strong and significant relationship, with a t-value of 18.224, indicating that ESG practices play a crucial role in influencing sustainable business growth. In contrast, H1 is not supported, while H2, H3, and H4 are supported based on the t-values and their significance at the 0.05 level. In summary, the analysis confirms that the size of the firm, competitive pressure, and ESG practices significantly influence sustainable business growth, while the relationship between ICT infrastructure and ESG practices was not found to be significant.

Mediating Effect

Table 7

Results of the Mediating Analysis

Hypotheses	Relationship	Std. Beta	Std. Dev	t-value	P-value	Decision
H5	ICT>ESG>SBG	-0.073	0.055	1.329	0.092	NS
H6	SOF>ESG >SBG	0.402	0.058	6.869	0.000	S
H7	CP>ESG >SBG	0.283	0.057	4.921	0.000	S

Notes*:* ICT Infrastructure, (Technological); Size of Firm, (Organizational); Competitive Pressure, (Environmental); SBG, (Sustainable Business Growth); S, Supported; NS, Not Supported

The results indicate that hypotheses were evaluated using the bootstrapping function in SmartPLS software, run at two-tailed with a 0.01 significance level. For H5 (ICT > SBG), the relationship was not significant, with a t-value of 1.329, indicating that ICT infrastructure does not significantly influence sustainable business growth, even with ESG practices as a mediator. In contrast, H6 (Size of Firm > SBG) was supported, with a t-value of 6.869, confirming that the size of the firm has a significant impact on sustainable business growth through its influence on ESG practices. Similarly, H7(Competitive Pressure > SBG) demonstrated a significant relationship, with a t-value of 4.921, showing that competitive pressure positively influences sustainable business growth, mediated by ESG practices. In contrast, H5 was rejected as the relationship was not significant, while H6 and H7 were supported, In summary, the analysis confirms that the size of the firm and competitive pressure significantly influence sustainable business growth through the mediating role of ESG practices, while the relationship between ICT infrastructure and sustainable business growth was not found to be significant, even with ESG practices as a mediator as revealed in Table 7.

Discussion

This study investigated the influence of technological, organizational, and environmental factors on ESG practices and their subsequent impact on Sustainable Business Growth (SBG)

within the Malaysian pharmaceutical industry, utilizing the Technology-Organization-Environment (TOE) framework. The findings provide valuable insights into the drivers of ESG adoption and its contribution to long-term business sustainability in a critical sector, offering both confirmations and unexpected nuances compared to broader literature.

The results indicate that firm size (H2) and competitive pressure (H3) significantly and positively influence the adoption of ESG practices. This aligns strongly with recent prior research suggesting that larger organizations typically possess greater financial, human, and structural resources, enabling them to invest more substantially in sustainability initiatives and manage their complexities (Fabrizi et al., 2022; Gong et al., 2024). Furthermore, larger firms often face heightened scrutiny from a wider array of stakeholders, including investors, regulators, and the public, which compels them to prioritize ESG to maintain legitimacy and reputation (Gillan et al., 2021; Aguilera et al., 2006; Liang et al., 2022). Similarly, the positive influence of competitive pressure on ESG adoption is consistent with recent strategic management literature, where firms in competitive environments are driven to differentiate themselves and respond to evolving market demands for sustainability to maintain or gain market share (Li & Wang, 2022). This suggests that in the Malaysian pharmaceutical sector, external market dynamics and internal organizational capacity are potent forces shaping a firm's commitment to ESG.

Crucially, the study confirms that ESG practices positively influence Sustainable Business Growth (SBG) (H4). This finding strongly supports the growing body of recent literature that positions ESG as a strategic imperative for long-term value creation, rather than merely a cost center (Zumente & Bistrova, 2021). Effective ESG integration enhances corporate reputation, improves operational efficiency through resource optimization, mitigates various risks (e.g., regulatory, reputational), and fosters innovation, all of which contribute to sustained economic success and resilience (Khan & Naeem, 2018). For the pharmaceutical industry, this implies that integrating environmental stewardship, social responsibility, and robust governance is not merely a compliance burden but a strategic pathway to achieving sustained competitive advantage and long-term profitability (Liang et al., 2022).

Furthermore, the mediation analysis revealed that ESG practices significantly mediate the relationships between firm size and SBG (H6) and between competitive pressure and SBG (H7) . This is a particularly important finding, as it suggests that the positive effects of being a larger firm or operating under intense competitive pressure on SBG are not direct, but are largely channelled through the effective implementation of ESG practices (Zhang et al., 2025; Saraphine et al., 2025). Larger firms, with their enhanced resources and greater visibility, are better able to translate these advantages into comprehensive ESG strategies, which then drive SBG (Aboelmaged, 2018; Fabrizi et al., 2022). Similarly, competitive pressure compels firms to adopt ESG practices as a strategic response to market demands, ultimately leading to sustainable growth by enhancing their market position and operational efficiency (Flammer, 2013; Li & Wang, 2022). This highlights ESG practices as a critical strategic mechanism through which organizational and environmental factors translate into improved business outcomes, underscoring their role as a strategic intermediary in achieving sustainable performance (Chen et al., 2025).

However, the study found that ICT infrastructure does not significantly influence ESG practices (H1) or mediate its relationship with SBG (H5). This unexpected finding contrasts with some prior research that emphasizes the role of technology in facilitating sustainability initiatives, particularly in data collection, analysis, and reporting (Aboelmaged, 2018; Cheng et al., 2024). A possible explanation for this in the Malaysian pharmaceutical context could be that while basic ICT infrastructure is ubiquitous, the specific advanced technologies required for sophisticated ESG data collection, analysis, and reporting might not yet be fully integrated or leveraged for sustainability purposes within the sampled firms (Li & Wang, 2022; Gong et al., 2024). It is plausible that firms are still in the early stages of digital transformation for ESG, or that they rely on traditional methods or external consultants for ESG management, diminishing the perceived direct impact of internal ICT infrastructure. Another possibility is that the current level of ICT infrastructure in the sampled firms is considered a baseline rather than a differentiating factor for ESG adoption, or that the measurement of ICT infrastructure did not fully capture its specific applications for ESG, such as dedicated sustainability software or AI-driven environmental monitoring systems (Sarkis et al., 2010). This finding suggests a potential gap in how pharmaceutical firms in this region are currently leveraging technology specifically for ESG integration, warranting further investigation.

Overall, these findings reinforce the applicability of the TOE framework in understanding ESG adoption within the pharmaceutical sector, while also highlighting contextual specificities. While technological readiness, as measured by general ICT infrastructure, did not emerge as a significant driver in this specific context, the organizational and environmental dimensions proved to be critical. The study particularly emphasizes the central role of ESG practices as a mediator, underscoring that simply having the capacity or being pressured is not enough; active and effective implementation of ESG strategies is what ultimately translates into sustainable business growth and long-term organizational success (Dyllick & Hockerts, 2002).

Theoretical and Practical Contributions

This study makes two key theoretical contributions. First, it integrates the Technology Organization Environment framework with Environmental, Social, and Governance practices to examine their combined influence on sustainable business growth in the pharmaceutical industry. By positioning ICT infrastructure, firm size, and competitive pressure as antecedents and ESG practices as a mediating mechanism, this study extends the application of the Technology Organization Environment framework into the sustainability and ESG literature. In doing so, it advances existing knowledge by demonstrating how technological, organizational, and environmental conditions jointly shape sustainability-driven business outcomes. Second, the study contributes to the ESG literature by empirically establishing the mediating role of ESG practices in linking Technology Organization Environment constructs to sustainable business growth. The findings underscore the strategic importance of ESG practices in supporting long term business growth, particularly in developing economies such as Malaysia, where sustainability and digital transformation are increasingly embedded in national and corporate agendas. This framework offers a foundation for future research to examine ESG-mediated relationships across different industries and institutional contexts, thereby enhancing its broader applicability.

In addition, this study offers three important practical implications. First, it provides actionable insights for decision makers in the pharmaceutical industry, including business

owners, policymakers, and sustainability managers. The findings highlight ESG practices as critical drivers of sustainable business growth, emphasizing the need to embed sustainability initiatives within core business strategies to improve operational efficiency, strengthen stakeholder trust, and enhance competitive positioning. Second, the results reveal the significant influence of firm size and competitive pressure on ESG adoption, indicating that larger firms and firms operating in highly competitive environments are more likely to implement sustainability practices. This insight is particularly relevant for smaller firms and new market entrants seeking to meet industry norms and stakeholder expectations, while also informing policymakers and regulators in designing targeted incentives and supportive frameworks to promote ESG adoption across firms of varying sizes. Finally, the study offers strategic guidance for multinational and foreign firms considering expansion into developing markets such as Malaysia. By emphasizing the role of ESG practices, the findings provide a pathway for aligning global sustainability commitments with local market conditions. Overall, this study enhances both theoretical and practical understanding of how the Technology Organization Environment framework and ESG practices jointly influence sustainable business growth, offering valuable insights for scholars, practitioners, and policymakers within the pharmaceutical sector and beyond.

Limitations and Future Research

This study is subject to one key limitation, as the empirical analysis is conducted within the pharmaceutical industry in Malaysia and focuses on the influence of Technology Organization Environment factors and Environmental, Social, and Governance practices on sustainable business growth. Consequently, the findings may have limited generalizability to other industries or geographical contexts. Future research could address this limitation by applying the proposed framework to different sectors and countries through comparative or cross-country studies, thereby examining how variations in institutional environments, regulatory regimes, and industry characteristics influence the relationship between Technology Organization Environment factors, ESG practices, and sustainable business growth. Such efforts would enhance the external validity and broader applicability of the framework.

Conclusion

In conclusion, this study contributes to the sustainable business growth literature by integrating the Technology Organization Environment framework with Environmental, Social, and Governance practices as a mediating mechanism. The proposed research model examines the effects of ICT infrastructure, firm size, and competitive pressure on ESG practices and their subsequent influence on sustainable business growth. The findings indicate that firm size and competitive pressure exert a positive and significant influence on ESG practices, which in turn drive sustainable business growth. In contrast, ICT infrastructure does not demonstrate a significant effect on ESG practices or sustainable business growth, suggesting that technological advancement alone is insufficient in the absence of supportive organizational capabilities and environmental conditions.

These results underscore the pivotal role of ESG practices in linking organizational and environmental factors to sustainable business growth and offer important insights for both researchers and practitioners. The study advances theory by extending the application of the Technology Organization Environment framework to sustainability research within the pharmaceutical industry and provides practical implications for firms seeking to embed

sustainability into their strategic decision-making. Overall, the findings highlight the importance of integrating ESG practices into core business strategies, particularly in emerging economies such as Malaysia, where sustainability is increasingly central to corporate competitiveness. This study thus provides a foundation for future research and offers actionable guidance for organizations aiming to align with global sustainability expectations while pursuing long-term growth.

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