PACIFIC RIM PROPERTY RESEARCH JOURNAL
2024, VOL.29, No.2, 30 – 65

ASSESSING THE IMPLEMENTATION OF ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) BY SOUTHEAST ASIAN LISTED PROPERTY COMPANIES

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Abstract

This study investigates the integration of Environmental, Social, and Governance (ESG) principles in Southeast Asia's real estate sector, focusing on how these principles are embedded into corporate strategies for sustainable development. It provides an understanding of ESG practices among the top listed property companies in Malaysia, Singapore, Indonesia, Thailand, and the Philippines, exploring the factors driving ESG adoption and the challenges faced in this region. Utilising a mixed-methods approach, the research analyses data from the annual reports of the top 10 listed property companies in each country, examining their ESG disclosures and practices. An ESG matrix evaluates each company's performance across environmental, social, and governance criteria. Principal component analysis (PCA) and rank correlation techniques assess the relationship between ESG performance and market value.

The findings indicate a growing trend towards ESG integration in Southeast Asia, with Singapore and Malaysia leading due to robust frameworks and government initiatives. Other countries like Indonesia, Thailand, and the Philippines are progressing but face challenges such as policy fragmentation and data scarcity. The study highlights the importance of comprehensive ESG strategies for sustainable growth and provides valuable insights for policymakers, investors, and stakeholders in a region often underrepresented in global ESG discussions.

Keywords: ESG; Southeast Asia; Listed Property Companies, Principal component analysis (PCA)

INTRODUCTION

The push for sustainable development and ethical business practices has made it essential to embed Environment, Social, and Governance (ESG) principles across industries, notably within the realm of the built environment. Given the considerable influence of building and construction activities on the environment, societal well-being, and governance frameworks, transitioning towards responsible and sustainable urban development becomes crucial. The real estate sector is a major player in environmental harm, accounting for a vast share of worldwide energy use, carbon emissions, and resource consumption. Incorporating ESG

criteria into the planning, construction, and management of real estate projects presents a significant opportunity to reduce carbon emissions, enhance energy efficiency, promote the use of sustainable materials, and minimize waste. Various studies have underscored the environmental benefits of incorporating ESG considerations into real estate practices, highlighting the vital role of the built environment in combating climate change and conserving natural resources. Incorporating ESG values in real estate projects can lead to a focus on social equity, improved health and safety for occupants, and the development of inclusive, vibrant communities. Designing sustainable buildings that consider indoor air quality, accessibility, and community involvement leads to healthier living environments, strengthens local economies, and nurtures social unity. Therefore, embedding ESG principles in the real estate is key to tackling social issues and promoting the well-being of various stakeholders.

The incorporation of ESG principles into the real estate is pivotal for fostering sustainable urban growth, reducing carbon emissions, improving energy efficiency, and cutting down waste production (Lokuwaduge, 2017; Baratta, 2023). This approach also aims to address social equity, occupant health and safety, and the creation of inclusive communities (Voland, 2022; Aldowaish, 2022). Nevertheless, the inconsistency in research concerning the environmental performance of buildings presents a hurdle (Miller, 2021). Employing systemic methods can facilitate the identification of synergies and trade-offs in achieving Sustainable Development Goals (Wieser, 2019). In emerging communities, it is crucial to advance analytical methods for context-aware design (Iskandar, 2022). Despite these advantages, some researchers argue that ESG ratings may not markedly influence corporate sustainability practices (Gomes, 2022).

Historically, the real estate sector has been guided chiefly by financial goals. However, there's a mounting shift towards acknowledging and fulfilling broader responsibilities. This sector is now under increasing pressure to emphasise sustainability, especially through the integration of Environmental, Social, and Governance (ESG) factors. This shift is driven by various sector-specific reasons, highlighting the critical need for adopting responsible and sustainable practices. It's becoming imperative for stakeholders within the real estate domain to adopt ESG principles, as the industry is being held to account for its environmental and societal impacts. Moreover, there's a demand for greater transparency regarding ESG performance from stakeholders (PRI, 2016). Institutional investors, in particular, are demanding that their investment companies make firm commitments to ESG criteria, putting additional pressure on the real estate sector to focus on sustainability (PRI, 2016). Nonetheless, there are limitations to how effectively ESG scoring metrics can green the financial sector (Senadheera 2021). Investing in ESG, particularly to reduce the carbon footprint, is deemed vital in the fight against climate change (Jinga 2021). A positive correlation exists between ESG commitment and investment performance in the real estate industry (Cajias 2011), yet there is a call for more comprehensive metrics in the social aspect of ESG (Newell 2023). The application of ESG within private real estate portfolios, particularly regarding environmental performance, is being thoroughly examined (Larsen 2010; Bauer 2011; Bauer 2010).

The integration of ESG factors in the real estate sector has gained momentum globally as businesses seek to incorporate sustainable and socially responsible practices into their operations. In Southeast Asia, this trend is becoming increasingly relevant as investors, corporate entities, and policymakers recognise the importance of ESG considerations in driving long-term value and sustainable development. The integration of ESG factors within the real estate sector of Southeast Asia countries signifies a crucial step toward sustainable development and responsible investment. The collective drive across Southeast Asia countries to embrace ESG principles reflects an understanding that sustainable real estate practices are essential for the region's long-term economic growth and resilience. By integrating ESG considerations into real estate developments, these countries are not only working towards environmental and social goals but are also positioning themselves as attractive destinations for responsible investment. This approach could potentially lead to stronger, more sustainable real estate markets, benefiting both the environment and the broader society.

The initiation of development processes in developed nations has led to significant environmental challenges, including deforestation, flash floods, landslides, pollution, hazardous waste, and the greenhouse effect. In the quest to achieve similar development status, countries in Southeast Asia are actively engaging in physical development activities related to real estate, which are crucial for their economic transformation. The importance of addressing these environmental issues within the development agenda has elevated the concept of sustainability to a critical national discourse, especially in Southeast Asian nations. The pursuit of sustainable development, aiming to harmonise current needs with future goals, has become particularly prominent in these countries (Moss, 1996; Mustafa, 2018; Maidin, 2012; Simpson, 2018; Keong, 2016; Phoorisart, 2017; Tisdell, 1996). Efforts to create environmental standards and management practices have been noted across the region (Moss, 1996), with Malaysia, for instance, focusing on the incorporation of environmental considerations into land development strategies (Maidin, 2012). Despite these efforts, Southeast Asia still faces challenges related to environmental degradation, highlighting the need for enhanced measures towards environmental preservation and sustainable growth (Keong, 2016). A comprehensive approach, integrating economic, social, political, and environmental facets, is emphasised, along with the importance of governance, decentralization, and clear property rights in fostering sustainable development (Tisdell, 1996).

Thus, the study focuses primarily on the top 50 property firms from five Southeast Asian countries, aiming to determine the degree of ESG integration in their property development endeavours. To quantify this, PCA and rank correlation analysis were employed, facilitating the assessment of the relationship between ESG performance and the corporate standing of these firms. This analytical approach, underpinned by indices from the FTSE ESG Ratings, Sustainability Asset Management Group (SAM), Ethical Investment Research Services (EIRIS), and Sustainable Investment Research Institute (SIRIS), is specifically tailored to capture the nuances of ESG integration within the Southeast Asian property business context.

LITERATURE REVIEW

Environmental, Social and Governance (ESG) in Real Estate

In the evolution of sustainability and corporate responsibility practices, the introduction of ESG as a comprehensive framework marks a significant advancement from traditional CSR (Corporate Social Responsibility) approaches. This development was initiated in 2004 by 20 financial institutions responding to a call from Kofi Annan, the then Secretary-General of the United Nations, highlighting a paradigm shift in how corporations and investors integrate ESG concerns into their business models (Kim et al., 2019). ESG's broader scope, explicitly including governance alongside environmental and social considerations, contrasts with CSR's more implicit approach to governance issues. This distinction positions ESG as a more expansive and integrative terminology than CSR, particularly beneficial for the property sector. For property developers, implementing an ESG framework not only fosters brand building and competitive advantage but also attracts environmentally conscious investors and homebuyers, signifying a move towards more sustainable and socially responsible business practices (Liang et al., 2017a). The adoption of ESG reporting standards has catalysed the property development and construction sectors towards embracing sustainable practices, evidenced by the emergence of climate heroes and the sector-wide pursuit of sustainability excellence.

Globally, the significance of ESG has surged across various domains, including business, industry, government, environmental, and community sectors, with the Environmental (E) aspect garnering substantial attention due to its worldwide relevance and urgency. In the realm of real estate, the development of essential Environmental metrics is noteworthy. The Global Real Estate Sustainability Benchmark (GRESB) is recognised as the premier standard at the asset/fund level, complemented by newer initiatives like GeoPhy, which enhance the precision of climate risk assessments for individual properties. The critical role of ESG in real estate investments calls for the refinement of benchmarks, particularly in the Environmental and Social dimensions (Newell, 2023). ESG investment strategies are crucial for addressing climate change, notably through efforts to reduce carbon emissions (Jinga 2021, Baratta 2023). Institutional investors' involvement in ESG evaluations emphasises a growing focus on environmental and social impacts (Matos 2020). The influence of ESG initiatives on the valuation of property assets, emphasising sustainable development strategies, is being closely studied (Warren, 2010). Furthermore, the integration of ESG and climate change risks into sovereign rating methodologies demands enhancements in the choice and application of indicators (Angelova, 2021). The effects of ESG adoption by credit rating agencies reveal a favourable outlook for entities demonstrating lower carbon footprints and superior social credentials (Yang, 2020).

Numerous real estate benchmarks from major index providers like Morgan Stanley Capital International (MSCI) are available, alongside construction level benchmarks such as Leadership in Energy and Environmental Design (LEED), Building Research Establishment Environmental Assessment Method (BREEAM), and Green Star, and reporting frameworks

like the Global Reporting Initiative and the Taskforce on Climate-Related Financial Disclosures. The real estate sector globally has widely adopted these benchmarks, positioning many firms at the forefront of ESG efforts. Leading examples include firms from Australia like Stockland, GPT, Mirvac, Dexus, and Lendlease; from Singapore like CDL and CapitaLand; from Europe like Hammerson, Land Securities, and PGGM; and from the USA like Boston Properties and Kilroy REIT. These companies regularly publish detailed ESG/sustainability reports on their websites, with a notable focus on environmental initiatives. CDL of Singapore stands out for its consistent inclusion in the Global 100 list of the world's most sustainable companies for the past decade, ranking 5th globally in 2022. It's typical for around three real estate firms to feature in the Global 100 each year. The industry consensus views Australian and European real estate firms as ESG frontrunners, closely followed by those in the USA, while Asia is perceived as lagging in ESG performance. The embrace of ESG benchmarks and reporting frameworks by the real estate sector worldwide, particularly by companies in Australia, Europe, and the USA, is noted by Cloutier (2020). The importance of environmental certifications like BREEAM, LEED, and Green Star is growing among property owners, although this has not yet translated into higher market values, according to Jernelius (2011). Vine (2008) mentions the potential of energy savings certificates to cut greenhouse gas emissions. In Australia, sustainability rating schemes such as Green Star and National Australian Built Environment Rating System (NABERS) are influencing the push towards sustainable building practices, as Warren (2010) observed. Meshcheryakova (2022) highlights the development of green building standards as a crucial aspect of the global ESG transformation. In India, initiatives to encourage the real estate sector to embrace ESG practices for carbon reduction are underway, as noted by Ram (2023). Additionally, the importance of environmental impact assessments in fostering low-carbon development within the real estate sector is discussed by Li (2023).

Environmental, Social and Governance (ESG) in Southeast Asia

International real estate investors have expressed interest in investing in the Asian emerging markets. The reason behind was strong economic performance in the region at least up to 1997 and the huge growth potential of the region in the future. The second reason for investing in such countries is the very high returns such economic generates. Indeed, in a survey of investors in the UK and Asia "higher returns" and the potential for "capital appreciation" were ranked one and two as the main reasons to hold foreign property (Lim, 2000). A final reason apart from sharing in such economic growth and higher expected returns is the additional diversification benefits that may accrue. Studies have shown the considerable benefits to be gained from the international diversification in real estate markets (see Lizerli et al 1998 for a review). London, New York and Tokyo, whose real estate markets are closely tied to the new international financial circuits. As a result, their real estate markets are more integrated and so offer low diversification benefits, Lizieri (1992). Thus, the benefits for portfolio risk reduction are likely to be even greater from diversify into emerging markets, Divecha et al (1992). Consequently, countries in the Southeast Asian region including Indonesia, Malaysia, the Philippines, Singapore, Taiwan, and Thailand have come to be seen

as areas of future investment because of their huge growth potential, greater returns and portfolio diversification benefits.

Southeast Asian presents several attractive incentives for investors in the listed real estate market compared to more established global regions. This could be high growth potential, diversification, and attractive yields due to lower asser prices and higher demand for real estate developments compared to developed economies. Increasing ESG adoption in Southeast Asia, spurred by urbanisation, climate vulnerabilities, and social disparities, is driving significant change, with countries like Thailand initiative in ESG disclosure and mandatory reporting (ASEAN-Japan Centre, 2018; Manongdo, 2018). Singapore's robust ESG framework is evidenced by substantial sustainability disclosures from its listed companies (More Listed Firms Reporting, 2018). Policies in the Philippines and Vietnam are also reflecting this shift toward ESG compliance and education (ASEAN-Japan Centre, 2018). Malaysia's sustainable investment market is notable, with the Sustainable and Responsible Investment Sukuk Framework and Environmental Quality Act supporting ESG integration (GSIA, 2016; ASEAN-Japan Centre, 2018).

Southeast Asia's economic strategies increasingly incorporate ESG, shifting from mere compliance to recognising ESG's added value (Loc, 2020; Roque, 1985). The ESG landscape is evolving, with research affirming its profitability and cost-reduction benefits for ASEAN firms, although its economic impact is varied (Korwatanasakul, 2021; Ghazali, 2023; Ali, 2022; Tzar, 2023). However, challenges like policy fragmentation and data scarcity persist. Clarifying ESG criteria is crucial to counteract greenwashing concerns and leverage ESG for economic and environmental progress, transforming resource constraints into opportunities for sustainable economic and social advancement (United Nations Human Settlements Programme, 2009).

The adoption of Environmental, Social, and Governance (ESG) principles is increasingly influencing regulatory frameworks and financial sectors across Southeast Asia, reflecting a growing commitment to sustainable development amid urbanization, climate vulnerabilities, and social disparities. Southeast Asian countries are taking distinct steps to incorporate ESG into their national strategies. Singapore has emerged as a leader in sustainable finance with robust frameworks and platforms like ESGenome for sustainability reporting, while Malaysia promotes ESG integration through the Sustainable and Responsible Investment Sukuk Framework and the Environmental Quality Act. Indonesia’s Green Taxonomy aims to boost sustainable investments, though challenges like delays in carbon tax implementation remain. Thailand has set ambitious climate goals, such as achieving carbon neutrality by 2050, supported by policies integrating ESG into corporate strategies. The Philippines is also advancing in ESG, focusing on sustainability reporting and emission reduction, but faces challenges related to unclear policies and socioeconomic issues. Despite varying degrees of implementation, there is a clear regional trend toward embedding ESG principles into economic strategies, which is essential for aligning with global sustainability goals, enhancing corporate governance, and managing environmental and social risks. While challenges like policy fragmentation and data scarcity persist, Southeast Asian nations are leveraging ESG to transform potential constraints into opportunities for sustainable growth.

The concepts of Environment, Social and Governance (ESG)

The conceptual analysis identifies twenty-seven represent ESG element and together synthesize and assemble the theoretical framework of ESG matrix. Each matrix represents distinctive meanings and aspects of the theoretical foundations of ESG. Environmental criteria show companies consideration in the environment aspect when doing the operation include energy efficiency, water management, waste management, biodiversity etc. This dimension evaluates a company's seriousness and its impact on environment. While, the "Social" aspect of Environmental, Social, and Governance (ESG) criteria refers to the ways in which a company manages relationships with its employees, suppliers, customers, and the communities where it operates. This dimension evaluates a company's social capital and its impact on society. The "Governance" component of Environmental, Social, and Governance (ESG) criteria focuses on the internal practices, controls, and procedures a company adopts to govern itself, make effective decisions, comply with the law, and meet the needs of external stakeholders.

This paper leverages the attributes defined by Ruhaya et al. (2016), who investigated the impact of ESG disclosures on corporate performance, to explore ESG practices within the real estate sector of Southeast Asian countries. Utilising a comprehensive ESG matrix, inspired by the contributions of multiple scholars including Balatbat, Siew, and Carmichael (2012); Galbreath (2013); Humphrey (2011); Ortas et al. (2015); and Wimmer (2013), this study evaluates the ESG performance of publicly listed real estate companies. These companies are scored on various ESG variables, reflecting their integration of ESG considerations into their operational, strategic, and financial frameworks. This study thus utilises the use of a thorough ESG matrix created by multiple academics, as shown in Table 1, stressing important factors to take into account while evaluating environmental, social, and governance aspects. The ESG criteria for companies in Southeast Asia cover three main dimensions: Environmental, Social, and Governance. Environmental criteria focus on reducing carbon footprints, enhancing energy efficiency, managing waste, conserving water, protecting biodiversity, complying with environmental policies, and investing in sustainable technologies. Social criteria assess a company's commitment to employee relations, health and safety, supply chain labor standards, community engagement, customer satisfaction, human rights, and corporate social responsibility initiatives. Governance criteria evaluate the diversity of board composition, fairness in executive compensation, integrity of audit committees, respect for shareholder rights, adherence to ethical practices, transparency in disclosures, effectiveness of risk management, conflict of interest policies, and sustainability oversight. These comprehensive ESG standards are designed to promote responsible business practices, mitigate risks, and ensure long-term sustainable growth.

Table 1: The Scorecard for Environmental, Social and Governance Matrix

No	ESG Criteria	Matrix	Details and Reference
1	Environmental	Carbon Footprint and Greenhouse Gas Emissions	Measuring a company's carbon footprint involves detailed assessments of all related greenhouse gas emissions, encompassing direct and indirect sources, and deploying strategies like renewable energy, improved energy efficiency, and carbon offsetting to mitigate these emissions (Onstwedder et al., 2021).
		Energy Efficiency and Renewable Energy Use	Evaluating a company's energy efficiency and reliance on renewable energy involves analysing energy reduction efforts and transitioning to sustainable sources like wind, solar, and hydroelectric power years (Salvi M et al, 2008; RICS, 2009).
		Waste Management and Pollution	The exploration of waste management within companies focuses on recycling, waste reduction, and the safe handling of hazardous materials, assessing the consequent effects on environmental pollution and mitigation efforts (Jones, 2004; Qian, 2021; Godswill, 2020 and Melnyk, 2003).
		Water Use and Conservation	This attribute assesses corporate water management, emphasising conservation and sustainable resource use, including wastewater treatment and footprint reduction, crucial in arid areas (Beebe, 2016 and Dvinskikh, 2021).
		Biodiversity and Land Use	Adhering to ESG standards requires evaluating and managing environmental impacts, including the effects on ecosystems and biodiversity critical for sustainable development (Falkenbach, 2010; Matos, 2020; Newell, 2023).

		Environmental Policies and Compliance	This attribute focuses on a company's adherence to environmental regulations, analysing environmental risk management, commitment to stewardship, and records of infractions (Tsalis, 2020).
		Sustainable Product Lifecycle	This attribute scrutinizes a company's products or services' environmental impact throughout their lifecycle, from raw material acquisition to final disposal, emphasising eco-friendly materials, sustainable packaging, and recyclability (Vendries, 2020).
		Climate Change Mitigation and Adaptation	This evaluation focuses on a company's approach to reducing its impact on climate change and enhancing resilience against its consequences (Stechemesser, 2015; Gasbarro, 2016).
		Supply Chain Sustainability	This ESG criterion scrutinises a company's supply chain environmental practices, highlighting sustainable sourcing and responsible procurement (Zeng (2022)
		Investment in Environmental Technologies	This aspect delves into a company's dedication to R&D in green technologies or eco-friendly products, focusing on innovations that lessen environmental damage (Xu, 2020).
2	Social	Employee Relations and Diversity	Examining a company's treatment of its employees involves assessing fair wages, benefits, working conditions, diversity, inclusion, equal opportunity policies, and anti-discrimination measures (Itam, 2018).
		Health and Safety	Assessing workplace health and safety standards entails measures to prevent accidents, injuries, and occupational diseases, alongside providing comprehensive health and safety training for employees (Smith, 2016).
		Supply Chain Labor Standards	Evaluating the labour practices and ethics within the company's supply chain. This includes ensuring that suppliers adhere to fair labour

			practices, child labour laws, and human rights standards (Berliner, 2015).
		Community Engagement and Development	Evaluating a company's engagement and investment in local communities encompasses charitable activities, development projects, and support for local initiatives (Sharmin, 2014).
		Customer Satisfaction and Data Protection	Assessing a company's customer interactions involves examining product quality, customer service, fair pricing, and data privacy, particularly for firms managing significant sensitive information (Themistocleous, 2018).
		Human Rights and Fair Labor Practices	Ensuring a company upholds human rights and engages in fair labour practices worldwide involves preventing involvement in human rights abuses and safeguarding against adverse impacts on local communities (Bright, 2020).
		Stakeholder Engagement	Ensuring product safety for consumers and corporate accountability for any adverse effects is fundamental, necessitating adherence to health and safety standards and prompt responses to recalls or safety issues (Martinez, 2019).
		Corporate Social Responsibility (CSR) Initiatives	Evaluating a company's Corporate Social Responsibility (CSR) efforts involves examining activities like environmental stewardship, philanthropy, volunteering, and ethical practices (Kiruthika, 2020).
3	Governance	Board Composition and Diversity	Evaluating board diversity involves analysing gender, ethnicity, experience, and background diversity, alongside the board's structure and independence (Martin, 2018).
		Executive Compensation	Examining executive compensation involves analysing salaries, bonuses, stock options, and benefits, alongside how these align with company performance and shareholder interests (Edmans, 2017).

		Audit Committee and Internal Controls	The audit committee's role in ensuring the accuracy and integrity of financial statements and internal controls is pivotal, encompassing financial reporting, internal audits, and risk management oversight (Gebrayel, 2018).
		Shareholder Rights	Assessing a company's respect for shareholder rights involves evaluating voting rights, influence on management and board decisions, and engagement practices (Mallin, 2012).
		Ethical Practices and Compliance	Evaluating a company's ethical business practices entails examining law adherence, anti-corruption policies, and the presence and enforcement of a code of ethics (Weber, 2013).
		Transparency and Disclosure	Transparency and disclosure in corporate governance are essential for stakeholder informed decision-making, encompassing risk, governance practices, and operational information, including financial and operational results, company objectives, share ownership, and remuneration policies (Fung, 2014; Jhunjhunwala, 2011).
		Risk Management	Assessing a company's risk management involves identifying, managing, and mitigating various risks such as financial, operational, reputational, environmental, and social, alongside evaluating the overall risk management framework's effectiveness (Kanchan, 2016).
		Conflict of Interest Policies	The implementation and enforcement of conflict of interest (COI) policies within companies are crucial for identifying, preventing, and managing potential conflicts, especially regarding board members and executives disclosing external engagements that might affect their decisions (Morciano, 2016).

		Sustainability Oversight	Evaluating governance structures' oversight on sustainability and ESG issues involves integrating these considerations into strategic and decision-making processes, alongside assessing stakeholder engagement across shareholders, employees, customers, suppliers, and the community (Zarządzania, 2022).

As discussed above, each elements represents distinctive meanings and aspects of the theoretical foundations of ESG. In addition, they have interwoven relations as Figure 1 shows. The elements of ESG are interconnected in various ways, where actions or decisions in one area can impact the others.

Figure 1: A Theoretical Framework for Environment, Social and Governance (ESG)
Source: Created by authors

According to the figure, environmental aspect connected to the social whereby environmental practices affecting community health and safety (e.g., pollution impacts). Effective environmental management can improve community relations and employee well-being. For instance, reducing pollution can lead to better health outcomes for local communities. While, environmental aspect impact governance decisions on environmental policies and compliance. Strong governance can drive better environmental performance through stringent policies and compliance mechanisms. Social aspects connected to environment factor in which employee safety and health initiatives (e.g., safe waste disposal practices), governance structures influence social policies, such as labor practices and community engagement efforts. For example, a diverse board may promote more inclusive labor

practices. Governance aspect connected to the environment where governance ensuring compliance with environmental regulations and governance impacting social policies (e.g., diversity policies, community engagement strategies). By understanding these interrelationships, real estate companies can develop more integrated and effective ESG strategies that address the complexities and interdependencies of these areas.

METHODOLOGIES

This paper investigates the annual reports of listed property companies in selected Southeast Asian nations, specifically focusing on the leading listed property companies from Malaysia, Indonesia, Thailand, Singapore, and the Philippines. These nations are home to the top ten listed property companies based on capital market value as of January 2024, as illustrated in Table 2. The selection process yielded a sample of the top 10 listed property companies across Southeast Asia, comprising Malaysia, Thailand, Singapore, the Philippines, and Indonesia. The top 50 companies included in this study were chosen from the stock markets of their respective countries, with the expectation that they are more inclined to maintain dynamic websites and provide comprehensive online information. Data acquisition was restricted to information readily available on these companies' websites. Moreover, a comprehensive set of ESG-related attributes was compiled to form what is herein referred to as the ESG matrix. This matrix served as a benchmark for evaluating each company's website, culminating in the assignment of scores to construct an index. This research facilitates an analysis of the correlation between the region's premier listed property companies and their adherence to an Environmental, Social, and Governance (ESG) matrix. Furthermore, a rank correlation technique was also employed in this paper to assess the ranking between “the scoring list” and “top companies based on market value”. The research specifically excludes Real Estate Investment Trusts (REITs) and Real Estate Operating Companies (REOCs) to maintain a focused analysis on listed property companies (LPCs). This exclusion is significant because REITs and REOCs are typically categorized under different segments in local investment portfolios and often follow different regulatory and operational frameworks than LPCs. By narrowing the scope to only include LPCs, the research aims to manipulate companies’ annual reports and provide a clearer understanding of the sustainability practices within this specific segment of the property sector.

The use of Principal Component Analysis (PCA) in this study is justified as an effective method to distil and interpret the complex data gathered from the annual reports of the top 10 listed property companies in each Southeast Asian country. These companies, selected based on their significant market capitalisation and ESG practices, provide a robust dataset that includes multiple ESG-related attributes, forming an ESG matrix. Given the breadth and diversity of ESG criteria, PCA is employed to reduce the dimensionality of the dataset while retaining the most critical information. This technique helps to identify key components that capture the majority of variance in ESG performance among these companies, simplifying the dataset without losing essential patterns or insights. By applying PCA, the research can uncover underlying relationships and groupings among the companies based on their ESG

practices, providing a clearer understanding of how different ESG dimensions contribute to overall sustainability performance. This approach allows for a more nuanced analysis of the factors driving ESG integration and highlights the areas where companies excel or need improvement. Additionally, PCA helps in visualizing complex data structures, making it easier to interpret and communicate findings to stakeholders, including corporate executives, investors, and policymakers, who can use these insights to inform their strategic decisions and promote sustainable practices in the real estate sector.

The decision to focus on the top 10 listed property companies based on market value in each Southeast Asian country is justified by several key factors. Firstly, these leading companies typically have high sustainability practices and well-established organisational processes, such as formal board responsibility for sustainability, stakeholder engagement, and a strategic long-term orientation. Research by Eccles et al. (2012) demonstrates that companies with robust sustainability practices tend to outperform their peers in both stock market and accounting performance. As such, these companies provide a valuable lens through which to examine best practices within the property sector, given their significant market capitalisation and influence over industry standards (Eccles et al., 2012). Secondly, the top 10 companies represent a substantial portion of the property sector in their respective countries, making them essential for gaining a comprehensive understanding of market dynamics. Their large size and market prominence ensure that they are subject to rigorous reporting requirements, particularly concerning Environmental, Social, and Governance (ESG) aspects. This enhances the availability and reliability of data, which is crucial for conducting a robust analysis. Moreover, these companies often set benchmarks for the rest of the industry, influencing both sector standards and broader market trends. Their policies and actions can have a cascading effect on the practices of smaller companies, making them pivotal in understanding and driving industry-wide sustainability initiatives. Focusing on these top companies allows for insights that are not only reflective of current industry practices but also highly relevant to stakeholders, including corporate executives, investors, and policymakers, who look to these market leaders to inform their own strategic decisions and address regional sustainability challenges.

Table 2: Top ten (10) listed property companies in Malaysia, Thailand, Singapore, The Philippines and Indonesia (as of January 2024)

	Companies	Market Value ($US million)
Malaysia		
1	IOI Properties Group Berhad	9,691.00
2	UOA Development Sdn Bhd	4,360.00
3	Sime Darby Property Berhad	4,285.00
4	UEM Sunrise Berhad	4,224.00
5	SP Setia Berhad	3,484.00
6	Eco World Development Group Berhad	3,121.00
7	IGB Berhad	2,993.00

8	Topicana Corporation Berhad	2,974.00
9	OSK Holdings Berhad	2,895.00
10	MRCB Berhad	2,661.00
Thailand		
1	Central Pattan	8,430.00
2	Land And House	2,710.00
3	WHA Corporation	2,080.00
4	Supalai	1,100.00
5	AP Thailand	1,040.00
6	WHA Premium-U	1,010.00
7	Frasers Proper	1,010.00
8	Frasers Prop-U	970.13
9	MBK/D	907.47
10	Lotus Retail	898.44
Singapore		
1	Capitaland Inv	11,770.00
2	Capitaland Int	10,100.00
3	Capitaland Asc	9,740.00
4	Mapletree Trus	6,250.00
5	Mapletree Pan	5,920.00
6	Mapletree Indu	5,280.00
7	City Development	4,410.00
8	UOL Group Limi	3,960.00
9	Frasers Log & C	3,210.00
10	Frasers Centre	2,910.00
Philipines		
1	SM Prime Holdings	17,440.00
2	Ayala Land	9,090.00
3	Ayala Corp	7,960.00
4	Areit Reit	1,440.00
5	Robinson Land	1,400.00
6	Megaworld Corp	1,120.00
7	Rl Commercial	997.84
8	8990 Holding	962.31
9	Mreit	660.19
10	Sta Lucia Land	506.10
Indonesia		
1	Pratama Abadi	4,570.00
2	Metropolitan K/D	1,690.00
3	Ciputra Development	1,470.00

4	Bumi Serpong	1,460.00
5	Pakuwon Jati	1,380.00
6	Maha Properti	1,320.00
7	Summarecon Agu	637.19
8	Jaya Real Prop	610.32
9	Plaza Indonesia	605.18
10	Duta Pertiwi	552.2

DISCUSSION AND FINDINGS

To analyse the strategies adopted by the companies concerning Environmental, Social, and Governance (ESG) criteria, a matrix methodology was employed. Tables 3 to 4 delineate the attribute scores assigned to the top ten companies within each country under consideration. The horizontal axis of these tables represents the cumulative score attained by each company across all attributes, while the vertical axis details the score achieved by each company for individual attributes. Scores were allocated to each company to articulate the overarching results and compile an index, facilitating a comprehensive evaluation of their ESG performance.

The ESG matrix findings for Malaysia reveal a comprehensive evaluation of the Environmental, Social, and Governance (ESG) criteria across the top ten listed property companies (see Table 3). Notably, all companies demonstrated full compliance with the majority of the environmental criteria, such as carbon footprint management, energy efficiency, and waste management, each scoring a perfect ten. However, biodiversity and land use were an area of lesser focus, with only seven companies meeting the criteria. In the social and governance domains, the companies uniformly excelled, achieving perfect scores in areas including employee relations, health and safety, and ethical practices, among others. The only exception within the governance criteria was board composition and diversity, where only eight companies met the standards. Overall, the companies showcased a strong commitment to ESG standards, with scores ranging from 25 to 27 out of a possible 27, indicating a high level of ESG integration within their operational frameworks. This matrix not only highlights the companies' dedication to sustainability and corporate responsibility but also points to areas for potential improvement, particularly in biodiversity and board diversity.

Table 3: ESG Matrix Findings: Malaysia

	Attributes/Company	1	2	3	4	5	6	7	8	9	10	Sc^2
Environmental Criteria												
1.	Carbon Footprint and Greenhouse Gas Emissions	√	√	√	√	√	√	√	√	√	√	10
2.	Energy Efficiency and Renewable Energy Use	√	√	√	√	√	√	√	√	√	√	10

3.	Waste Management and Pollution	√	√	√	√	√	√	√	√	√	√	10
4.	Water Use and Conservation	√	√	√	√	√	√	√	√	√	√	10
5.	Biodiversity and Land Use	x	x	√	√	√	√	x	√	√	√	7
6.	Environmental Policies and Compliance	√	√	√	√	√	√	√	√	√	√	10
7.	Sustainable Product Lifecycle	√	√	√	√	√	√	√	√	√	√	10
8.	Climate Change Mitigation and Adaptation	√	√	√	√	√	√	√	√	√	√	10
9.	Supply Chain Sustainability	√	√	√	√	√	√	√	√	√	√	10
10.	Investment in Environmental Technologies	√	√	√	√	√	√	√	√	√	√	10
Social Criteria												
11.	Employee Relations and Diversity	√	√	√	√	√	√	√	√	√	√	10
12.	Health and Safety	√	√	√	√	√	√	√	√	√	√	10
13.	Supply Chain Labor Standards	√	√	√	√	√	√	√	√	√	√	10
14.	Community Engagement and Development	√	√	√	√	√	√	√	√	√	√	10
15.	Customer Satisfaction and Data Protection	√	√	√	√	√	√	√	√	√	√	10
16.	Human Rights and Fair Labor Practices	√	√	√	√	√	√	√	√	√	√	10
17.	Stakeholder Engagement	√	√	√	√	√	√	√	√	√	√	10
18.	Corporate Social Responsibility (CSR) Initiatives	√	√	√	√	√	√	√	√	√	√	10
Governance Criteria												
19.	Board Composition and Diversity	x	√	x	√	√	√	√	√	√	√	8
20.	Executive Compensation	√	√	√	√	√	√	√	√	√	√	10
21.	Audit Committee and Internal Controls	√	√	√	√	√	√	√	√	√	√	10
22.	Shareholder Rights	√	√	√	√	√	√	√	√	√	√	10
23.	Ethical Practices and Compliance	√	√	√	√	√	√	√	√	√	√	10
24.	Transparency and Disclosure	√	√	√	√	√	√	√	√	√	√	10
25.	Risk Management	√	√	√	√	√	√	√	√	√	√	10
26.	Conflict of Interest Policies	√	√	√	√	√	√	√	√	√	√	10
27.	Sustainability Oversight	√	√	√	√	√	√	√	√	√	√	10
	Score	25	26	26	27	27	27	26	27	27	27	

Note: Sc^2:Score; 1.IOI Property, 2.UOA Development, 3. Sime Darby, 4.UEM, 5.SP Setia, 6.ECO World, 7.IGB Berhad, 8.Tropicana, 9.OSK, 10.MRCB

Table 4 summarised results from the ESG matrix reveal a comprehensive assessment of Environmental, Social, and Governance (ESG) criteria across ten selected companies in The Philippines. In the environmental category, most companies excelled, with scores consistently high across criteria such as carbon footprint management, energy efficiency, waste management, and climate change mitigation, each predominantly scoring nine or ten. However, investment in environmental technologies and environmental policies compliance indicated areas for improvement with lower scores of seven and eight respectively. In contrast, the social criteria showcased universal excellence, with each company achieving perfect scores across all indicators, reflecting robust practices in employee relations, community engagement, health and safety, and CSR initiatives. Governance criteria revealed slightly varied performance, particularly in board composition and diversity, executive compensation, and sustainability oversight, where scores dipped slightly to nine, indicating minor discrepancies in governance practices. Overall, the scores ranged from 20 to 27, with most companies demonstrating strong ESG adherence, highlighting their commitment to sustainable and responsible business practices.

Table 4: ESG Matrix Findings: The Philippines

	Attributes/Company	1	2	3	4	5	6	7	8	9	10	Sc^2
Environmental Criteria												
1.	Carbon Footprint and Greenhouse Gas Emissions	√	√	√	x	√	√	√	√	√	√	9
2.	Energy Efficiency and Renewable Energy Use	√	√	√	x	√	√	√	√	√	√	9
3.	Waste Management and Pollution	√	√	√	√	√	√	√	√	√	√	10
4.	Water Use and Conservation	√	√	√	√	√	√	√	√	√	√	10
5.	Biodiversity and Land Use	√	√	√	√	√	√	√	√	x	√	9
6.	Environmental Policies and Compliance	√	√	√	x	√	√	x	√	√	√	8
7.	Sustainable Product Lifecycle	√	√	√	√	√	√	√	√	√	√	10
8.	Climate Change Mitigation and Adaptation	√	√	√	√	√	√	√	√	√	√	10
9.	Supply Chain Sustainability	√	√	√	√	√	√	√	√	√	√	10
10.	Investment in Environmental Technologies	√	√	√	√	√	√	x	x	√	x	7
Social Criteria												
11.	Employee Relations and Diversity	√	√	√	√	√	√	√	√	√	√	10
12.	Health and Safety	√	√	√	√	√	√	√	√	√	√	10
13.	Supply Chain Labor Standards	√	√	√	√	√	√	√	√	√	√	10
14.	Community Engagement and Development	√	√	√	√	√	√	√	√	√	√	10

15.	Customer Satisfaction and Data Protection	√	√	√	√	√	√	√	√	√	√	10
16.	Human Rights and Fair Labor Practices	√	√	√	√	√	√	√	√	√	√	10
17.	Stakeholder Engagement	√	√	√	√	√	√	√	√	√	√	10
18.	Corporate Social Responsibility (CSR) Initiatives	√	√	√	√	√	√	√	√	√	√	10
Governance Criteria												
19.	Board Composition and Diversity	√	√	√	x	√	√	√	√	√	√	9
20.	Executive Compensation	√	√	√	x	√	√	√	√	√	√	9
21.	Audit Committee and Internal Controls	√	√	√	√	√	√	√	√	√	√	10
22.	Shareholder Rights	√	√	√	√	√	√	√	√	√	√	10
23.	Ethical Practices and Compliance	√	√	√	√	√	√	√	√	√	√	10
24.	Transparency and Disclosure	√	√	√	√	√	√	√	√	√	√	10
25.	Risk Management	√	√	√	√	√	√	√	√	√	√	10
26.	Conflict of Interest Policies	√	√	√	x	√	√	√	√	√	√	9
27.	Sustainability Oversight	√	√	√	x	√	√	√	√	√	√	9
	Score	27	27	27	20	27	27	25	26	26	26	

Note: Sc^2:Score; 1.SM Prime, 2.Ayala Land, 3.Ayala Corp, 4.AREIT, 5.Robinson, 6.MegaWorld, 7.RL Commercial, 8.8990 Holding, 9.MREIT, 10.STA Lucia

The ESG matrix findings for Thailand demonstrate a strong commitment to Environmental, Social, and Governance (ESG) criteria across ten leading companies (see Table 5). The environmental segment showed exceptional adherence, with almost all companies scoring perfect tens in carbon footprint reduction, energy efficiency, waste management, water conservation, and climate change mitigation, underscoring their commitment to environmental stewardship. Notably, biodiversity and land use, and investment in environmental technologies, indicated slight discrepancies with scores of 10 and 8, respectively, suggesting areas for potential improvement. In the social criteria, the companies uniformly achieved top marks, reflecting excellent practices in employee relations, health and safety, community engagement, and CSR initiatives, among others. Governance criteria saw slightly varied performance with board composition and diversity, executive compensation, ethical practices, risk management, conflict of interest policies, and sustainability oversight scoring slightly lower, mostly at 9 and 8, highlighting governance as an area for further enhancement. Overall, scores ranged from 22 to 27, revealing a high level of ESG integration within the operational frameworks of these companies, with room for further refinement in specific governance areas.

Table 5: ESG Matrix Findings: Thailand

	Attributes/Company	1	2	3	4	5	6	7	8	9	10	Sc^2
Environmental Criteria												
1.	Carbon Footprint and Greenhouse Gas Emissions	√	√	√	√	√	√	√	√	√	√	10
2.	Energy Efficiency and Renewable Energy Use	√	√	√	√	√	√	√	√	√	√	10
3.	Waste Management and Pollution	√	√	√	√	√	√	√	√	√	√	10
4.	Water Use and Conservation	√	√	√	√	√	√	√	√	√	√	10
5.	Biodiversity and Land Use	√	√	√	√	√	√	√	√	x	√	10
6.	Environmental Policies and Compliance	√	√	√	√	√	√	x	√	√	√	9
7.	Sustainable Product Lifecycle	√	√	√	√	√	√	√	√	√	√	10
8.	Climate Change Mitigation and Adaptation	√	√	√	√	√	√	√	√	√	√	10
9.	Supply Chain Sustainability	√	√	√	√	√	√	√	√	√	√	10
10.	Investment in Environmental Technologies	√	√	√	√	√	√	x	√	√	x	8
Social Criteria												
11.	Employee Relations and Diversity	√	√	√	√	√	√	√	√	√	√	10
12.	Health and Safety	√	√	√	√	√	√	√	√	√	√	10
13.	Supply Chain Labor Standards	√	√	√	√	√	√	√	√	√	√	10
14.	Community Engagement and Development	√	√	√	√	√	√	√	√	√	√	10
15.	Customer Satisfaction and Data Protection	√	√	√	√	√	√	√	√	√	√	10
16.	Human Rights and Fair Labor Practices	√	√	√	√	√	√	√	√	√	√	10
17.	Stakeholder Engagement	√	√	√	√	√	√	√	√	√	√	10
18.	Corporate Social Responsibility (CSR) Initiatives	√	√	√	√	√	√	√	√	√	√	10
Governance Criteria												
19.	Board Composition and Diversity	√	√	√	x	√	√	√	√	√	√	9
20.	Executive Compensation	√	√	√	x	√	√	√	x	√	√	8
21.	Audit Committee and Internal Controls	√	√	√	√	√	√	√	√	√	√	10
22.	Shareholder Rights	√	√	√	√	√	√	√	√	√	√	10
23.	Ethical Practices and Compliance	√	√	√	√	√	√	√	x	√	√	9
24.	Transparency and Disclosure	√	√	√	√	√	√	√	√	√	√	10

25.	Risk Management	√	√	√	√	√	√	√	x	√	√	9
26.	Conflict of Interest Policies	√	√	√	√	√	√	√	x	√	√	9
27.	Sustainability Oversight	√	√	√	√	√	√	√	x	√	√	9
	Score	27	27	27	25	27	27	25	22	26	26	

Note: Sc^2:Score; 1.Central Pattan, 2.Land and House, 3.WHA Corp, 4.Supalai, 5.AP Thailand, 6.WHA Premium, 7.Frasers Prop, 8.Frasers Prop-U, 9.MBK/D, 10.Lotus Retail

The examination of ESG metrics within Singapore's context reveals commendable commitment across a spectrum of ten distinguished firms, particularly in the realms of Environmental, Social, and Governance standards as indicate in Table 6. The unanimous fulfilment of environmental benchmarks—ranging from greenhouse gas emission control to water conservation—underscores a dedicated environmental stewardship. Nonetheless, areas such as biodiversity, policy adherence, and product life cycle sustainability present opportunities for further refinement. The social dimension displayed exemplary practices, especially in aspects like employee well-being and community relations, with labour standards in the supply chain signalling a minor gap. In governance, the firms demonstrated exemplary adherence across several domains, including board diversity and ethical governance, though executive compensation and conflict of interest policies emerged as focal points for potential enhancement. Scores spanned from 24 to 27, portraying an entrenched ESG ethos with pinpointed avenues for incremental progress in their comprehensive ESG strategies.

Table 6: ESG Matrix Findings: Singapore

	Attributes/Company	1	2	3	4	5	6	7	8	9	10	Sc^2
Environmental Criteria												
1.	Carbon Footprint and Greenhouse Gas Emissions	√	√	√	√	√	√	√	√	√	√	10
2.	Energy Efficiency and Renewable Energy Use	√	√	√	√	√	√	√	√	√	√	10
3.	Waste Management and Pollution	√	√	√	√	√	√	√	√	√	√	10
4.	Water Use and Conservation	√	√	√	√	√	√	√	√	√	√	10
5.	Biodiversity and Land Use	√	√	√	√	√	√	√	x	√	√	9
6.	Environmental Policies and Compliance	√	√	√	√	√	√	√	x	√	√	9
7.	Sustainable Product Lifecycle	√	√	x	√	√	√	√	√	√	√	9
8.	Climate Change Mitigation and Adaptation	√	√	√	√	√	√	√	√	√	√	10
9.	Supply Chain Sustainability	√	√	√	√	√	√	√	√	√	√	10
10.	Investment in Environmental Technologies	√	√	√	√	√	√	√	√	√	√	10
Social Criteria												

11.	Employee Relations and Diversity	√	√	√	√	√	√	√	√	√	√	10
12.	Health and Safety	√	√	√	√	√	√	√	√	√	√	10
13.	Supply Chain Labor Standards	√	√	√	x	√	√	√	√	√	√	9
14.	Community Engagement and Development	√	√	√	√	√	√	√	√	√	√	10
15.	Customer Satisfaction and Data Protection	√	√	√	√	√	√	√	√	√	√	10
16.	Human Rights and Fair Labor Practices	√	√	√	√	√	√	√	√	√	√	10
17.	Stakeholder Engagement	√	√	√	√	√	√	√	√	√	√	10
18.	Corporate Social Responsibility (CSR) Initiatives	√	√	√	√	√	√	√	√	√	√	10
Governance Criteria												
19.	Board Composition and Diversity	√	√	√	√	√	√	√	√	√	√	10
20.	Executive Compensation	√	√	x	√	√	√	√	√	√	√	9
21.	Audit Committee and Internal Controls	√	√	√	√	√	√	√	√	√	√	10
22.	Shareholder Rights	√	√	√	√	√	√	√	√	√	√	10
23.	Ethical Practices and Compliance	√	√	√	√	√	√	√	√	√	√	10
24.	Transparency and Disclosure	√	√	√	√	√	√	√	√	√	√	10
25.	Risk Management	√	√	√	√	√	√	√	√	√	√	10
26.	Conflict of Interest Policies	√	√	x	√	√	√	√	√	√	√	10
27.	Sustainability Oversight	√	√	√	√	√	√	√	√	√	√	10
	Score	27	27	24	26	27	27	27	25	27	27	

Note: Sc^2:Score; 1.Capitaland Inv, 2.Capitaland Int, 3.Capitaland Asc, 4.Mapletree Trus, 5.Mapletree Pan, 6.Mapletree Indu, 7.City Development, 8.UOL Group, 9.Frasers Log&C, 10.Frasers Centre

Table 7 exhibit the ESG matrix score across listed property companies in Indonesia. The findings for Indonesia exhibit a robust commitment to Environmental, Social, and Governance (ESG) criteria among the top ten companies. Environmental aspects were particularly strong, with all companies consistently achieving perfect scores in carbon footprint reduction, energy efficiency, waste management, water conservation, and climate change mitigation. However, biodiversity and land use, and supply chain sustainability emerged as areas with lower adherence, reflected by scores of 5 and 7 respectively. Social criteria also demonstrated commendable performance, particularly in health and safety, and human rights and fair labour practices, with slight variations in employee relations and supply chain labour standards. Governance criteria revealed comprehensive compliance, notably in board diversity, ethical practices, and risk management, though sustainability oversight and executive compensation indicated minor gaps for improvement. Overall, the scores ranged from 20 to 27, indicating a high degree of ESG integration with targeted opportunities for

advancement, particularly in enhancing biodiversity focus and strengthening supply chain and governance practices.

Table 7: ESG Matrix Findings: Indonesia

	Attributes/Company	1	2	3	4	5	6	7	8	9	10	Sc^2
Environmental Criteria												
1.	Carbon Footprint and Greenhouse Gas Emissions	√	√	√	√	√	√	√	√	√	√	10
2.	Energy Efficiency and Renewable Energy Use	√	√	√	√	√	√	√	√	√	√	10
3.	Waste Management and Pollution	√	√	√	√	√	√	√	√	√	√	10
4.	Water Use and Conservation	√	√	√	√	√	√	√	√	√	√	10
5.	Biodiversity and Land Use	√	x	√	x	x	√	√	√	x	x	5
6.	Environmental Policies and Compliance	√	√	√	√	√	√	√	√	√	√	10
7.	Sustainable Product Lifecycle	√	√	√	√	√	√	√	√	x	√	9
8.	Climate Change Mitigation and Adaptation	√	√	√	√	√	√	√	√	√	√	10
9.	Supply Chain Sustainability	x	√	√	√	√	√	√	√	x	x	7
10.	Investment in Environmental Technologies	√	√	√	√	√	√	√	√	√	√	10
Social Criteria												
11.	Employee Relations and Diversity	√	√	√	√	√	√	√	√	x	x	8
12.	Health and Safety	√	√	√	√	√	√	√	√	√	√	10
13.	Supply Chain Labor Standards	√	√	√	√	√	√	√	√	x	x	8
14.	Community Engagement and Development	√	√	√	√	√	√	√	√	√	x	9
15.	Customer Satisfaction and Data Protection	√	√	√	√	√	√	√	√	√	√	10
16.	Human Rights and Fair Labor Practices	√	√	√	√	√	√	√	√	√	√	10
17.	Stakeholder Engagement	√	√	√	√	√	√	√	√	√	√	10
18.	Corporate Social Responsibility (CSR) Initiatives	√	√	√	√	√	√	√	√	√	x	9
Governance Criteria												
19.	Board Composition and Diversity	√	√	√	√	√	√	√	√	√	√	10
20.	Executive Compensation	√	√	√	√	x	√	√	√	√	√	9
21.	Audit Committee and Internal Controls	√	√	√	√	√	√	√	√	√	√	10
22.	Shareholder Rights	√	√	√	√	√	√	√	√	√	√	10

23.	Ethical Practices and Compliance	√	√	√	√	√	√	√	√	√	√	10
24.	Transparency and Disclosure	√	√	√	√	√	√	√	√	√	√	10
25.	Risk Management	√	√	√	√	√	√	√	√	√	√	10
26.	Conflict of Interest Policies	√	√	√	√	√	√	√	√	√	√	10
27.	Sustainability Oversight	√	√	√	√	√	√	√	√	√	x	9
	Score	26	26	27	26	25	27	27	27	22	20	

Note: Sc^2:Score; 1.Pratama Abadi, 2.Metropolitan K/D, 3.Ciputra Development, 4.Bumi Serpong, 5.Pakuwon Jati, 6.Maha Properti, 7.Summarecon, 8.Jaya Real Prop, 9.Plaza Indonesia, 10. Duta Pertiwi

The rank correlation graph (Figure 2) illustrates the relationship between market value (MV_R) and ESG scores (ESG_R) of listed property companies across Southeast Asia. It appears that a significant cluster of companies, such as UEM Sunrise (Malaysia), SP Setia (Malaysia), Eco World Development (Malaysia), WHA Premium (Thailand), City Development (Singapore), Frasers Logistics & Commercial Trust (Singapore), and Capitaland Integrated Commercial Trust (Singapore), achieve high ESG scores while also have a high market value, suggesting that robust ESG practices may correlate with better market performance or company valuation. Conversely, several companies with lower market values, such as Metropolitan Land (Indonesia), Pratama Abadi (Indonesia) and Bumi Serpong (Indonesia), also have lower ESG scores. This might indicate that smaller companies or those with lower market capitalisation may have less developed ESG practices or face more challenges in implementing comprehensive ESG measures.

Companies like Frasers Property-U (Singapore), UOL Group (Singapore), and Pakuwon Jati (Indonesia), which have mid-range market values, show varying ESG scores. This variance implies that while ESG practices are an integral part of a company's operational success, other factors may also significantly influence the market value.

In a nutshell, the analysis suggests a trend where companies with higher market values tend to have higher ESG scores, indicating that robust sustainability practices are being recognised and possibly rewarded in the marketplace. This could reflect investors' increasing valuation of ESG compliance as indicative of a company's resilience, risk management, and long-term sustainability. However, the variability among companies with mid-to-lower market values indicates that the relationship between ESG performance and market value is not uniformly linear and may be influenced by a range of other factors.

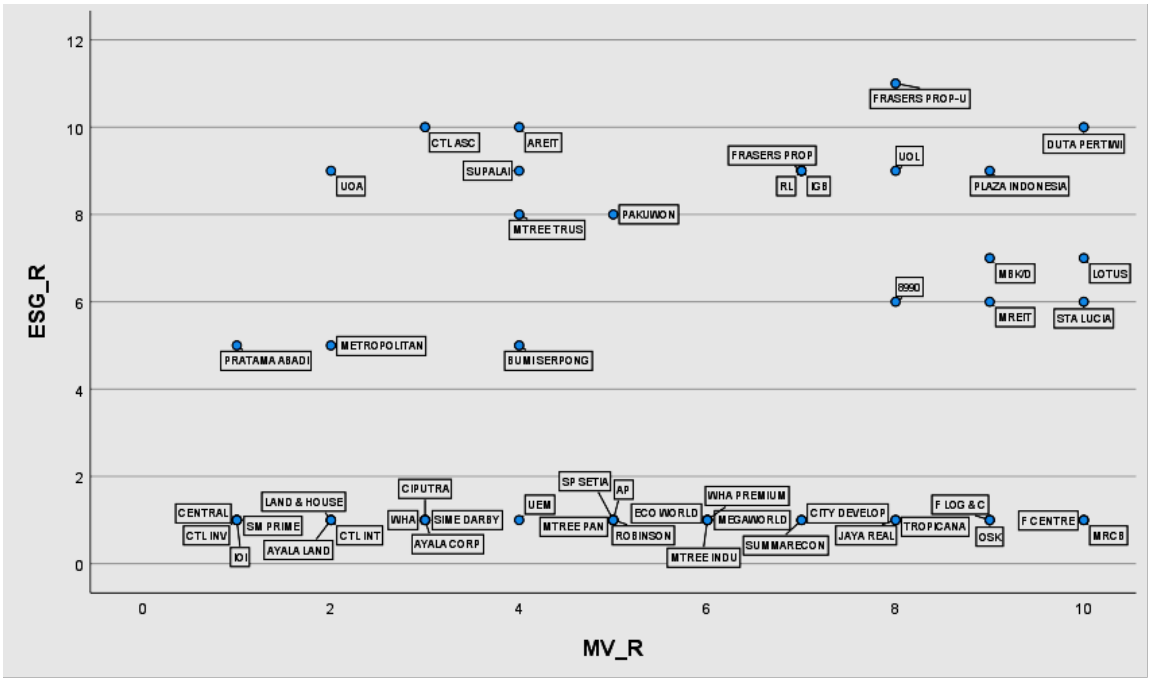

Figure 2: Rank Correlation: ESG and Top 50 Listed property companies In Southeast Asia

Principal Component Analysis (PCA)

Principal Components Analysis (PCA) is a practical and standard statistical tool in modern data analysis that has found application in different areas. It has been called one of the most precious results from applied linear algebra. Principal component analysis (PCA) involves a mathematical procedure that transforms a number of (possibly) correlated variables into a (smaller) number of uncorrelated variables called principal components. The first principal component accounts for as much of the variability in the data as possible and each succeeding component accounts for as much of the remaining variability as possible (Paul et al., 2013). ESG data often involve numerous indicators across environmental, social, and governance dimensions. PCA reduces the complexity by identifying the key components that capture most of the variability, making the analysis more manageable. Therefore, the PCA used in this research can be used to determine which ESG factors are most influential in driving overall sustainability performance, helping companies prioritize their efforts.

The PCA results for the ESG Matrix Findings in Malaysia indicate that the first principal component (PC1) accounts for approximately 60.91% of the variance in the dataset, while the second principal component (PC2) explains about 39.09% of the variance (Figure 3). A scatter plot based on these two principal components provides a visual representation of the companies' ESG performance, allowing for the identification of companies with similar ESG profiles. Additionally, the figure of principal component scores shows each company's position in the reduced-dimensionality space created by PCA. Since the first two components capture all the variance, this suggests that most of the variability in ESG scores among companies can be effectively summarized by these two components, highlighting a high level of correlation among the ESG criteria.

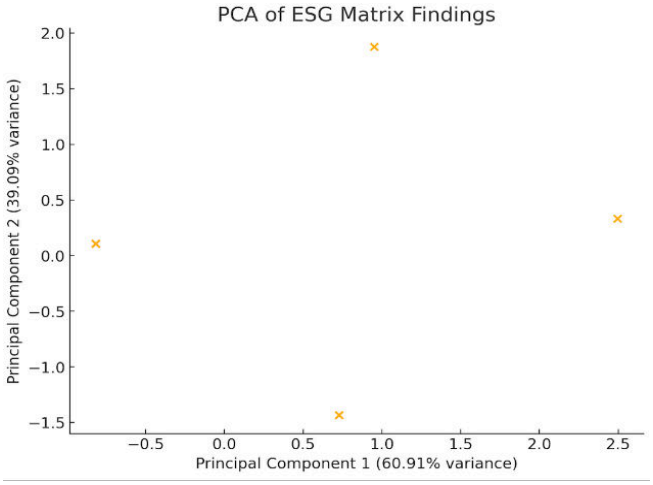

Figure 3: ESG PCA Matrix Listed Property Companies: Malaysia

The PCA results for the updated ESG Matrix Findings in The Philippines reveal that the first principal component (PC1) explains approximately 72.64% of the variance in the dataset, while the second principal component (PC2) accounts for about 14.92% of the variance. The scatter plot based on these two principal components visually represents the ESG performance of companies, helping to identify those with similar profiles. The figure of principal component scores indicates each company's position in the reduced-dimensionality space. With the first two components capturing a significant portion of the variance, it suggests that the ESG criteria are strongly correlated, allowing for a substantial reduction in dimensionality without losing much information (Figure 4).

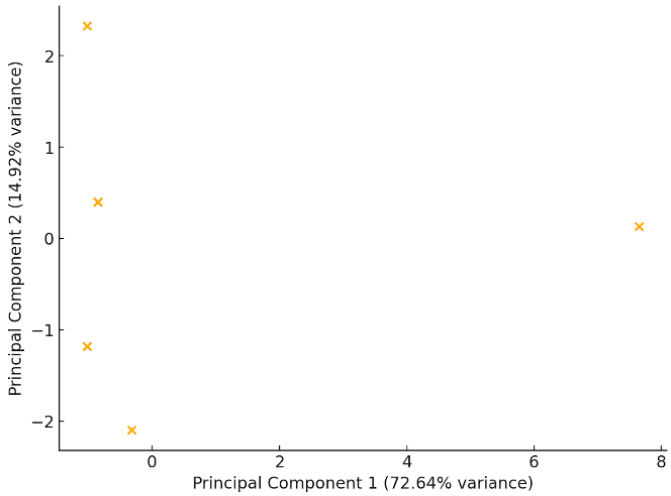

Figure 4: ESG PCA Matrix Listed Property Companies: The Philippines

The PCA results for the updated ESG Matrix Findings in Thailand reveal that the first principal component (PC1) explains approximately 51.13% of the variance in the dataset, while the second principal component (PC2) accounts for about 19.93% of the variance. The scatter plot based on these two principal components visually represents the ESG performance of companies, helping to identify those with similar profiles. The figure of

principal component scores shows each company's position in the reduced-dimensionality space. With the first two components capturing a significant portion of the variance, it indicates that the ESG criteria exhibit moderate correlation, which allows for a meaningful reduction in dimensionality while retaining important information (Figure 5).

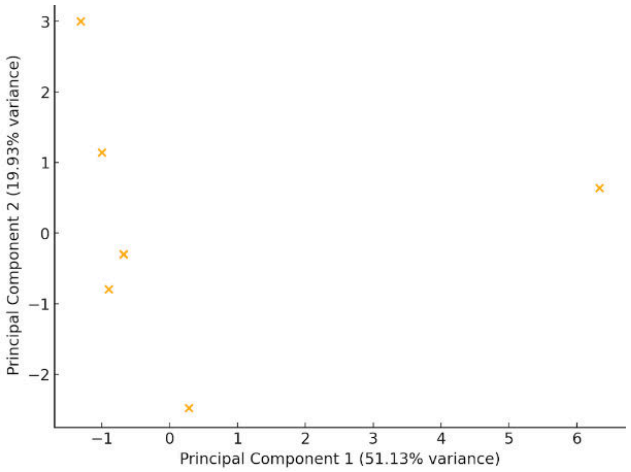

Figure 5: ESG PCA Matrix Listed Property Companies: Thailand

The PCA results for the updated ESG Matrix Findings in Singapore reveal that the first principal component (PC1) explains approximately 51.33% of the variance in the dataset, while the second principal component (PC2) accounts for about 32.85% of the variance. The scatter plot based on these two principal components visually represents the ESG performance of companies, helping to identify those with similar profiles. The figure of principal component scores shows each company's position in the reduced-dimensionality space. With the first two components capturing a substantial portion of the variance, it indicates that the ESG criteria exhibit significant correlations, allowing for a meaningful reduction in dimensionality while retaining essential information (Figure 6).

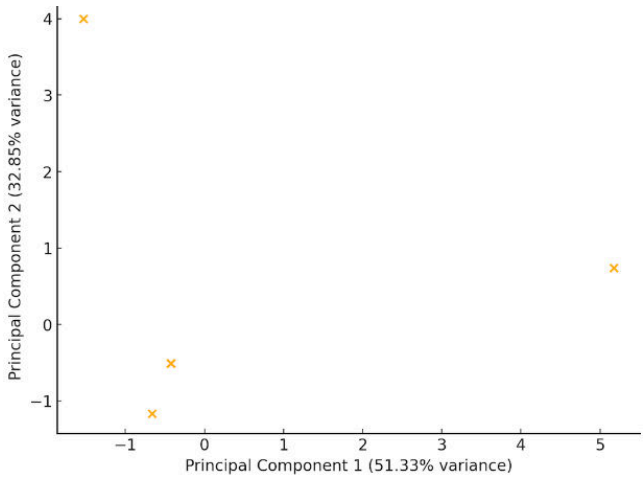

Figure 6: ESG PCA Matrix Listed Property Companies: Singapore

The PCA results for the updated ESG Matrix Findings in Indonesia indicate that the first principal component (PC1) explains approximately 56.10% of the variance in the dataset,

while the second principal component (PC2) accounts for about 20.96% of the variance. The scatter plot based on these two principal components provides a visual representation of the ESG performance of companies, helping to identify those with similar profiles. The figure of principal component scores shows each company's position in the reduced-dimensionality space. With the first two components capturing a substantial portion of the variance, it suggests that there are significant correlations among the ESG criteria, enabling a meaningful reduction in dimensionality while retaining important information (Figure 7).

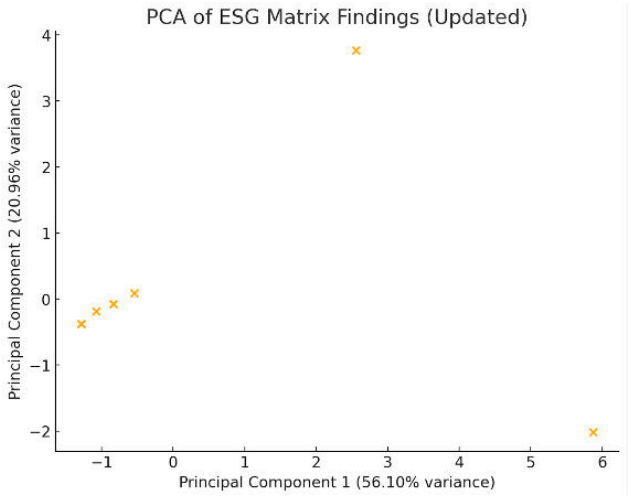

Figure 7: ESG PCA Matrix Listed Property Companies: Indonesia

Figure 8 summarises the PCA explained variance for ESG Matrix Findings across five countries: Malaysia, the Philippines, Thailand, Singapore, and Indonesia. It shows the variance explained by the first principal component (PC1) and the second principal component (PC2) for each country. Malaysia and the Philippines have higher variance explained by PC1, indicating strong correlation among ESG criteria, while Thailand, Singapore, and Indonesia have a more balanced variance distribution between PC1 and PC2, suggesting moderate to significant correlations. This visualization helps in understanding how ESG criteria contribute to the overall variance in each country's dataset.

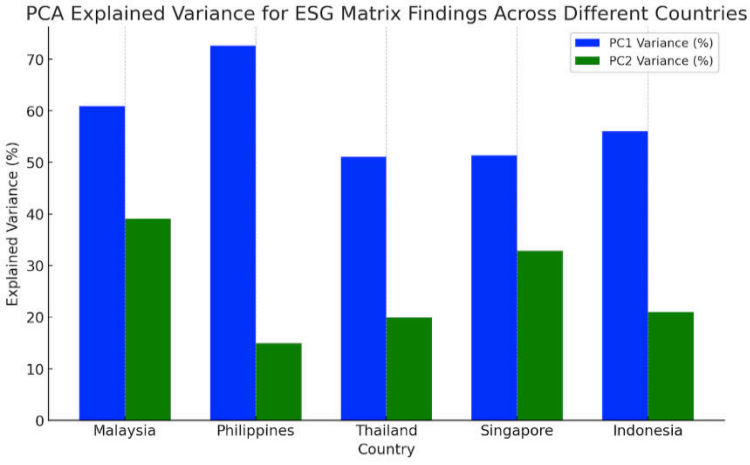

Figure 8: ESG Matrix Variance for Southeast Asian Countries

ESG in Southeast Asian Countries – the way forward

The implementation of Environmental, Social, and Governance (ESG) factors among listed real estate companies in Southeast Asia is becoming increasingly significant, with sustainability now a top priority for property buyers and investors in the region. These stakeholders are increasingly demanding energy-efficient properties with low carbon emissions, sustainable materials, and innovative features such as solar-powered energy, reflecting a heightened awareness of the environmental impact of real estate choices. As a result, there is growing interest in eco-friendly and green developments, including off-grid homes with smart grid technology integration. This trend aligns with a global shift towards sustainability, highlighting the real estate sector's evolving role in promoting environmental stewardship and sustainable practices.

In Malaysia, listed real estate companies have shown a strong commitment to sustainability, achieving high compliance with environmental criteria such as carbon footprint management, energy efficiency, and waste management. However, areas such as biodiversity and board diversity require further improvement (Sahoo and Kumar, 2023). Similarly, companies in the Philippines have excelled in both environmental and social criteria, though governance practices revealed minor discrepancies. Despite its challenges, the Philippines has seen an upward trend in average ESG scores post-COVID (Miller et al., 2023; Hassan et al., 2021). Thailand's real estate companies have demonstrated strong ESG integration, particularly in environmental and social criteria, though governance remains an area for improvement (Phokchai, 2021; Almeyda and Darmansyah, 2019). In Singapore, while firms show robust adherence to environmental and governance standards, opportunities for refinement exist in biodiversity and policy adherence (Pham et al., 2019). Indonesia also reflects strong ESG commitment, with high scores in environmental performance, but highlights gaps in sustainability oversight and executive compensation.

Overall, the research indicates that high market value correlates with strong ESG adherence among Southeast Asian real estate companies, suggesting that robust sustainability practices are increasingly recognized and rewarded in the marketplace (Sharma et al., 2020; Hannah et al., 2021; Qiu et al., 2021). However, challenges such as limited knowledge, skill resource gaps, and the lack of collective regulatory efforts persist, slowing ESG adoption compared to regions like Australia, Europe, and North America (Falendra Kumar Sudan, 2020). Continuous improvement in ESG practices is essential to maintain competitiveness on the global stage, with increased awareness and implementation efforts by regional governments playing a crucial role in driving sustainable development.

CONCLUSION

The significance of ESG within Southeast Asian listed real estate companies is increasingly pronounced, as evidenced by the high ESG scores achieved by most firms across several countries in the region. Such performance underscores the growing importance placed on sustainability, corporate responsibility, and governance, which is now a benchmark for

operational success and a potential driver of market value. The adoption of Environmental, Social, and Governance (ESG) practices in real estate listed companies across Southeast Asia, including Malaysia, Thailand, the Philippines, Indonesia, and Singapore, is gaining traction, though the level of integration and commitment varies by country.

The relationship between ESG principles, listed real rstate strategies, and the diverse client base of LREs is multifaceted and depending on several factors such as geographic focus, asset type, company size and structure. however, there is a growing need to better understand how these linkages operate in practice. Each component influences the other, creating a dynamic that warrants further exploration. Different levels of ESG adoption across markets and client preferences create a need for flexible and adaptable strategies in LREs. Developing standardized metrics to measure and report ESG performance in the LRE sector can help bridge the gap between client expectations and LRE strategies. Further research and discussion could explore best practices for measuring and reporting ESG outcomes specific to real estate. Across Southeast Asia, regulatory pressure and government initiatives are key drivers for ESG adoption. Countries are increasingly implementing policies to promote sustainability and transparency in the real estate sector. Despite progress, challenges remain, including varying levels of regulatory enforcement, differences in market maturity, and the need for more standardized ESG reporting frameworks. The interconnectedness of ESG factors creates a holistic framework for real estate companies in Southeast Asia to operate sustainably and responsibly. By integrating ESG considerations into their business strategies, real estate companies can enhance their resilience, attract investment, and contribute to the sustainable development of the region. Failure to do so, on the other hand, may result in financial losses, reputational damage, and missed opportunities in an increasingly ESG-conscious market. Overall, while the pace and depth of ESG adoption in the real estate sector vary by country, there is a clear trend towards greater integration of these principles across Southeast Asia.

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