ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) CONSIDERATIONS: BUILDING OCCUPANTS' PERSPECTIVES

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ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) CONSIDERATIONS: BUILDING OCCUPANTS' PERSPECTIVES

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A project report submitted in partial fulfilment of the requirements for the award of Bachelor of Science (Honours) Quantity Surveying

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DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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ABSTRACT

The real estate sector significantly contributes to climate change, accounting for approximately nearly one-third of carbon emissions and over a third of energy consumption. As individuals spent approximately 90% of their time indoors, this raised important concerns regarding health, well-being, and quality of life. While numerous studies explored ESG practices in relation to financial performance, limited research has focused on ESG practices from the perspective of building occupants. Therefore, this study aims to uncover the ESG considerations from building occupants' perspective in Malaysia. The literature review identified eighteen (18) important ESG practices, which served as the basis to examine twenty-three (23) ESG criteria, grouped into nine (9) environmental, eight (8) social, and six (6) governance aspects. A quantitative approach was employed in this study, where an online questionnaire was distributed to building occupants of high-rise buildings in Klang Valley. A total of 148 responses were collected and analysed using the Cronbach's Alpha Reliability Test, Arithmetic Mean, Mann-Whitney U Test, Kruskal-Wallis Test, and Spearman's Correlation Test. The Arithmetic Mean results revealed that safety and security, along with health and well-being, were perceived as the most important ESG practices. Occupants placed the highest value on criteria such as the installation of security systems and the adoption of energy-efficient technologies. However, the adoption of renewable energy and green certifications remained low, with only security systems and natural lighting being commonly implemented. The Mann-Whitney U test indicated that tenants, married individuals, and highly educated occupants significantly prioritised affordability, cost reduction, and resource efficiency. Meanwhile, the Kruskal-Wallis test identified significant differences across age, property age, education level, and geographical location, highlighting the varying ESG preferences among occupants with different demographic and residential backgrounds. A strong correlation was identified using Spearman's Correlation test between "enhancing water efficiency" and "practicing water conservation." The findings underscore the importance of integrating occupant perspectives to support sustainable development goals and to encourage responsible property management within Malaysia's urban residential sector.

Keywords: Environmental; Social; Governance; ESG practices; Building occupants

Subject Area: HT101-395 Urban groups. The city. Urban sociology

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LIST OF SYMBOLS / ABBREVIATIONS

e	margin of error
n	sample size
p	the proportion of the population with attributes in study
q	1 – p
z	z-scores of the desired confidence level

ESG	Environment, Social, and Governance
CO_2	Carbon Dioxide
TJ	Terajoule
LEED	Leadership in Energy and Environmental Design
SST	Sales and Service Tax
EV	Electric Vehicle
HVAC	Heating, Ventilation, and Air Conditioning
LED	Light Emitting Diode
VOCs	Volatile Organic Compounds
PV	Photovoltaic
GRI	Global Reporting Initiative
SASB	Sustainability Accounting Standards Board
SBS	Sick Building Syndrome
CTL	Central Limit Theorem
SPSS	Statistical Package for the Social Sciences
ToD	Transit-Oriented Development

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter provides an overview of this research such as background of study, problem statement, research aim, research objectives, research methodology, research scope and chapter outline.

1.2 Background of Study

The built environment sector is known as one of the largest contributors to global carbon emissions. According to the United Nations Environment Programme (2025), this sector accounted for 37% of global energy consumption and 37% of carbon emissions in 2023. Despite a slight increase in CO_2 emissions, overall energy use surged by 8.8% compared to 2022. Malaysia has been one of the major contributors to CO_2 emissions in Southeast Asia (Rehman *et al*., 2024). In 2022, Malaysia emitted 7.10 tonnes of carbon dioxide per capita (IEA, 2024). In comparison, other developing countries, including China, Thailand, and Indonesia, have recorded per capita carbon emissions of 8.4, 3.8, and 2.2 tonnes, respectively (Zaidi and Haw, 2023). This emphasises the urgent need to enhance energy efficiency and decarbonise homes to mitigate the impact of climate change.

Bienert *et al*. (2022) emphasised that the real estate sector contributes nearly 40% of global energy-related carbon emissions, primarily due to building operations such as heating, cooling, and electricity consumption. In Malaysia, residential electricity consumption rose by approximately 17%, from 113,652 TJ in 2019 to 132,862 TJ in 2022, accounting about 23% of the country's total electricity use in 2022 (IEA, 2024). United Nations Environment Programme (2022) further reported that the construction, renovation, and demolition activities of the real estate sector have generated 35% of global waste directed to landfills. Additionally, buildings consume one-fifth of global freshwater (Dixit and Kumar, 2023) and account for 40% of raw material usage (Dsilva, Zarmukhambetova and Locke, 2023). Considering these substantial impacts, sustainable development aims to balance environmental, social, and governance

(ESG) concerns to address the needs of the current population while safeguarding the ability of future generations to meet their own needs. In this framework, ESG practices have emerged as a key approach for assessing the sustainability and ethical implications of properties (RICS, 2022).

The environmental pillar of the ESG framework prioritises promoting environmental sustainability through energy efficiency, waste management, water conservation, and the use of renewable energy sources (Senadheera *et al*., 2022). By focusing on these aspects, global carbon dioxide levels could be reduced by up to 10% by 2030 compared to current levels (IEA, 2022). Meanwhile, the social pillar emphasises the well-being of individuals and communities by prioritising health and safety standards, fostering social inclusion, engaging with the community, and ensuring access to social amenities (Norhisham, 2022). This focus enhances the quality of life within the sector (GRESB, 2021). On the other hand, the governance pillar encompasses policies and practices designed to ensure ethical management, transparency, and accountability (Kim, 2023). Notably, 33% of participants have considered the governance pillar the most influential in steering businesses toward more sustainable real estate practices (Li, Lai and How, 2022). This highlights the significant role of the governance pillar in achieving sustainability objectives within the sector.

Implementing ESG practices in the real estate sector can mitigate climate change, enhance social equity, and promote sustainable development. Additionally, ESG initiatives in real estate offer significant economic benefits, including cost savings from energy efficiency, increased property values, and improved long-term financial performance (Scherrenberg, Wessels and Nelisse, 2024). Hence, it is suggested to integrate ESG practices to achieve both sustainable and ethical development in the real estate sector.

1.3 Problem Statement

Research on ESG principles across various sectors has been conducted globally, encompassing both developed and developing countries. For instance, Zhou *et al*. (2023) assessed the impact of ESG practices on the manufacturing industry in Bangladesh. In India, the incorporation of ESG principles in the context of technological disruptions in the banking sector was evaluated by Yadav,

Premalatha and Patil (2024). Meanwhile, Treepongkaruna and Suttipun (2024) examined the impact of ESG reporting on corporate profitability in Thailand. Additionally, research in the United Kingdom compared ESG performance and financial performnace between SMEs and large firms (Le, 2024). Furthermore, Voronina (2023) analysed ESG investments within oil companies in Russia.

Besides that, several studies have been conducted on ESG principles in the real estate sector. Robinson and McIntosh (2022) examined the factors and impacts of ESG on the commercial real estate market. Additionally, numerous studies have evaluated the connection between ESG performance and financial performance in real estate (Morri, Yang and Colantoni, 2024; Almeyda and Darmansyah, 2019; Andersson and Leorato, 2022; Lundberg and Pokrasen, 2023; Shehab, 2021). Chen (2023) discussed the integration of ESG strategies in real estate companies, while Backenroth and Magnusson (2023) identified the relationship between ESG and property values. Apart from that, Olteanu and Ionascu (2023) highlighted the importance of ESG in real estate investments.

Other than that, several studies have evaluated ESG considerations from the perspective of industry practitioners. For instance, Liu *et al*. (2024) investigated the ESG-related characteristics of the investor, property owners, and managers in United Kingdom. Park and Jang (2021) explored the impact of ESG management on investment decisions from an investor's perspective in South Korea. Anshuman (2022) investigated the perspectives of investors, occupiers, and developers on ESG considerations in India. Similarly, Thakker, Wang and Giese (2023) focused on the investors' viewpoint regarding ESG considerations in North America, Europe and Pacific. In addition, Zhang and Liu (2022) briefly outlined the principal-agent and organisational legitimacy perspectives on ESG performance in China. Moreover, Wang (2024) evaluated the correlation between ESG factors and corporate performance based on a stakeholder perspective in China. Khamisu, Paluri and Sonwaney (2024) surveyed stakeholders' perspectives on the critical success factors for ESG implementation in India.

In Malaysia, the available ESG-related research includes studies on the ESG factors that influence investors' investment decisions (Tang and Teoh, 2023; Wong, 2023). Additionally, the effect of ESG disclosure on firm performance was examined by Mohammad and Wasiuzzaman (2021); Ahmad

et al. (2021). Besides that, Chua *et al*. (2023) analysed the impact of ESG on the financial performance of healthcare-related companies. Meanwhile, Ratnasingam *et al*. (2023) identified the awareness, implementation, and challenges of adopting ESG principles in the Malaysian wood products and furniture industries. The effective implementation of ESG practices in Malaysia SME was discussed by Tan *et al*. (2023).

Previous research reveals a gap in studies that focus on ESG considerations from the perspective of building occupants. Mannan and Al-Ghamdi (2021) stated that building occupants spend about 90% of their time in indoor environments which has significant implications for their health, well-being, and overall quality of life. Hence, this research aims to fill the gap by investigating ESG considerations from the perspective of building occupants in Malaysia. By conducting this research, industry practitioners can apply the findings to effectively integrate ESG practices into the real estate sector by considering from building occupants' perspectives.

1.4 Research Aim

The research aims to uncover the environmental, social and governance (ESG) considerations from building occupants' perspective in Malaysia.

1.5 Research Objectives

To achieve the aim of the research, three objectives are formulated.

i. To determine the importance of incorporating ESG practices from building occupants' perspective.
ii. To examine the ESG criteria from building occupants' perspective.
iii. To evaluate the ESG practices from building occupants' perspective.

1.6 Research Methodology

This research adopted a quantitative approach. A questionnaire was created using Google Forms and distributed to building occupants through social media platforms for data collection. The collected data were analysed using Cronbach's Alpha Reliability Test, Arithmetic Mean, Mann-Whitney U Test, Kruskal-Wallis Test, and Spearman's Correlation Test.

1.7 Research Scope

The scope of this research focuses on building occupants of high-rise residential properties with 17 stories and more within the Klang Valley. This area was selected due to its high population density and rapid urban development, which highlight the need for effective assessment of ESG practices.

1.8 Report Structure

The research is structured into five chapters. Chapter 1 outlines the framework for the research study. The background of the study is first covered. The research gap is also expressed in the problem statement section. Meanwhile, the research aims, objectives, methodology, and scope are also outlined in this chapter as well. Chapter 2 presents the literature review. The information was collected from both primary and secondary literature sources, which include journals, articles, and other published public resources. This chapter provides the ESG criteria and the importance of incorporating ESG practices from the building occupants' perspective.

Chapter 3 covers the research methodology, focusing on the data and information collected from targeted respondents. It also offers a detailed explanation of the research method, including the rationale for its selection, the sampling design, approaches to data collection, and data analysis techniques. Chapter 4 presents the results of the questionnaire survey. A statistical analysis was performed on the data gathered from the questionnaire. The data were examined, and the results are presented in the form of figures and tables, indicating that the study's objectives were met. Chapter 5 provides a conclusion that summarises the research findings, covering research aim and objectives. This chapter also outlines the limitations encountered and offers reasonable recommendations for improving future studies on relevant topics.

1.9 Chapter Summary

In a nutshell, this study addresses a research gap by examining ESG considerations from the perspective of building occupants. The problem statement has been clarified, and specific research aims and objectives have been formulated to bridge this gap. In addition, the research methodology has been outlined, and the structure of each chapter has been discussed.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter is structured into four sections. It begins with an overview of Environmental, Social, and Governance (ESG) considerations in real estate, followed by a discussion of the roles of building occupants involved in ESG practices within the real estate industry. Next, the importance of incorporating ESG from the building occupants' perspective is discussed. Finally, the ESG criteria from the perspective of building occupants are examined.

2.2 Environmental, Social and Governance (ESG)

The concept of ESG has been explored by various researchers in recent years. Mottola *et al*. (2022) revealed that only 21% of a sample of 1,228 respondents knew what the letters in ESG stand for. Moreover, there is no exact definition of ESG, as industry practitioners and scholars have provided different explanations (Li, et al., 2021; Boffo, Marshall and Patalano, 2020). For instance, some studies defined ESG as a framework that extends beyond traditional financial indicators used by investors to assess the viability of investments in the financial sector (Somelar, 2024; Valerevna, 2023). Other studies described ESG as a framework that investors, stakeholders, and developers use to assess a property's sustainability and ethical impact in the real estate sector (Olteanu and Ionascu, 2023). Hence, the definition of ESG may vary across different industry sectors.

The ESG framework is classified into three pillar, which are the environmental, social, and governance. To clarify further, the environmental pillar of ESG primarily focuses on practices that promote sustainability and reduce the ecological footprint of buildings. These practices include key aspects such as energy use, the use of sustainable materials, waste management, water conservation, biodiversity preservation, and other environmental impacts (Boffo, Marshall and Patalano, 2020). Given that the real estate sector is the largest contributor to climate change among all industries, these key aspects are crucial in driving improvements in energy efficiency (Lang *et al*., 2021),

pollution control (Cloutier, 2020), climate change mitigation (Li *et al*., 2024), and overall environmental performance. Thus, emphasising the environmental pillar of ESG promotes the adoption of sustainable practices within the real estate sector.

Olteanu and Ionascu (2023) and Liu *et al.* (2024) defined the social pillar as the impact of a property on the communities, occupants, and society at large. This pillar encompasses key elements such as affordable housing, community involvement, tenant health and safety, inclusion, and the well-being of individuals related with the property (Archer-Svoboda, 2022; Newell and Marzuki, 2024). By focusing on the social pillar of ESG, it helps to increase productivity, enhance reputation, raise property values, and foster strong relationship with stakeholders. Ishnazarova *et al.* (2023) further asserted that the social pillar contributes to an improved quality of life for people. Thus, the social pillar of ESG promotes positive outcomes for both social and economic aspects of the real estate sector.

The governance pillar serves as a framework for evaluating ethics, transparency, and accountability within the real estate sector (Olteanu and Ionascu, 2023). Yin (2023) adduced that this pillar involves the stakeholder engagement, accountability, transparency, and risk management. By emphasising the governance aspect of ESG, properties can build greater trust with occupants, mitigate risks, and uphold strong ethical standards. These efforts collectively make properties more attractive to stakeholders. Further, Kulova and Nikolova-Alexieva (2023) claimed that the governance pillar also enhances reputation and fosters strong relationships with stakeholders. Therefore, the governance pillar of ESG is essential for establishing a resilient and sustainable real estate industry.

2.2.1 Environmental, Social and Governance (ESG) Considerations in Real Estate

Research revealed that residential buildings in Klang Valley have contributed to increased energy consumption (Ramli *et al*., 2022), air pollution (Ling, 2020), waste pollution (Yusoff and Asmuni, 2021), and other negative impacts on the environment. These factors highlights the environmental challenges faced by residential buildings in the region. Furthermore, Kaur (2023) indicated that

about 80% of building occupants are willing to either pay a premium for offices equipped with green features, negotiate discounts on spaces lacking ESG considerations, or reject workspaces that do not meet ESG standards. This indicates that a majority of building occupants are becoming increasingly concerned about the environmental quality of their living or working spaces. Consequently, the environmental pillar of ESG plays a vital role in promoting sustainability and reducing the ecological footprint of buildings.

In terms of social pillar, Ezzati (2021) reported that the Klang Valley is experiencing an annual population growth rate of 0.5%, leading to rapid urbanisation and exacerbating issues such as social inequality and housing unaffordability. Besides, several studies have identified challenges faced by high-rise properties in Klang Valley, including inadequate safety and security (Azian, Yusof and Kamal, 2020), poor indoor air quality (Sahabuddin *et al*., 2022), limited accessibility (Kamarudin *et al*., 2023), and lack of social inclusion. A survey by CBRE (2023) articulated that 49% of respondents would refuse to live in a building associated with social issues, while 82% considered access to public transport a key factor in their real estate decisions. These findings emphasise the critical role of the social pillar of ESG, which prioritises the well-being and sustainable development of individuals and communities within the real estate sector.

In terms of governance, the Klang Valley property market has grappled with transparency issues, creating opportunities for unethical practices (Yakub, 2019). As Malaysia's regulatory frameworks are constantly changing to align with global best practices, properties in the Klang Valley may face challenges that could pose physical risks, such as complying with new safety or environmental regulations. Further, Park and Jang (2021) have stated that 35% of participants identified the governance pillar of ESG as a significant factor influencing their decision-making process. Therefore, the governance pillar is essential for ensuring ethical standards, transparency, and effective risk management in property management within the real estate sector.

2.3 Building Occupants

Building occupants are defined as anyone who occupies or uses a building, whether they own it, rent it, or are there for any other purpose (Harputlugil and

Wilde, 2021). This included tenants, owners, employees, visitors, or anyone else who is present within the premises. Although occupants do not typically hold financial responsibility for the lease or have specific property rights, they are still bound by property regulations regarding noise, maintenance, and guest policies.

The relationship between building occupants and ESG principles is crucial, as their behaviors and usage patterns significantly impact a building's operational performance and efficiency. This is further supported by Feng, Chokwitthaya and Lu (2024) that occupant actions such as adjusting thermostats, controlling lights, using appliances, and pulling window blinds up or down can significantly impact energy consumption and overall comfort levels. These behaviors can create a gap between the predicted and actual energy performance, which may reduce the effectiveness of ESG practices. Furthermore, ESG initiatives are also vital for enhancing the well-being of building occupants by fostering healthier indoor environments, improving air quality, and encouraging sustainable living practices (Hopkins, 2023).

2.3.1 Building Owner

A building owner, often interchangeably referred to as a landlord or property owner, is defined as an individual or entity who owns a property and rents or leases it out to tenants (Rose, 1973). Building owners are responsible for property maintenance, collecting rent, handling taxes, and ensuring compliance with lease agreements. They also have legal obligations to their tenants, such as providing a habitable living environment and addressing maintenance issues promptly (Mizani, 2024).

Furthermore, building owners are the primary decision-makers within their properties (Miu and Hawkes, 2020). This indicated that they hold substantial influence over decisions regarding the implementation of ESG initiatives. Consequently, building owners decide whether to invest in energy-efficient systems, use sustainable materials, and adopt effective waste management practices in the building. Wong and Chan (2024) further showed that 30% of tenants currently prioritise building owners with strong ESG practices when selecting their building. This finding highlights the increasing importance of ESG for building owners in the real estate industry. Additionally,

Johnson and Miller (2022) also mentioned that building owners who adopt ESG practices can increase rental income, obtain tax incentives, and boost the market value of their property. Similarly, Wong and Chan (2024) also revealed that building owners who implement strong ESG performance in their buildings can gain competitive benefits in attracting and retaining tenants over the long term. Therefore, building owners play a key role in implementing ESG practices, as their decisions impact property sustainability and tenant satisfaction.

2.3.2 Tenants

According to Anuar and Wahab (2022), tenants are individuals or entities who rent or lease a property from building owners. They typically pay rent to the building owner in exchange for the right to inhabit and use the property for a specified period, as outlined in the lease agreement (Arinze, 2021). While tenants do not own the property, they have specific rights and responsibilities as stipulated in the lease agreement.

Tenants play a crucial role in the successful implementation of ESG practices within the real estate sector. Their behaviors and decisions, such as managing energy consumption, participating in recycling programs, and supporting green building features, directly influence a building's environmental performance (Hafez *et al*., 2023). For instance, recycling programs are only effective when tenants actively participate (Knickmeyer, 2020). Furthermore, tenant engagement in ESG practices helps reduce operational costs, including energy and water usage, resulting in savings for building owners. Kwok *et al*. (2020) also unfolded that ESG initiatives improve tenant satisfaction, which in turn can lead to longer lease terms. Therefore, tenants are key to ESG practices, as their actions directly impact a building's sustainability and operational efficiency.

Table 2.1: Previous Studies on Importance of Incorporating ESG Practices from a Building Occupant's Perspective.

No.	Importance	Previous Studies
1.	Enhanced Health and Well-being	Wang and Xue (2023); Jamaludin and Razali (2024); Ghosn, Warren-Myers and Candido (2024); Cloutier (2020); Ifediora and Nwosu (2024); Ahmed *et al* (2022)
2.	Improved Energy Efficiency	Bera *et al*. (2024); Sharma (2024); Olteanu and Ionascu (2023); Jamaludin and Razali (2024); Kempeneer, Peeters and Compernolle (2021); Ghosn, Warren-Myers and Candido (2024)
3.	Increased Marketability and Demand	Ober (2024); Bowen *et al*. (2024); Cherkasova and Nenuzhenko (2022); Vonlanthen (2024); Walacik and Chmielewska (2024)
4.	Increased Property Value	Johnson and Miller (2022); Walacik and Chmielewska (2024); Lionel *et al*. (2023); Robinson and McIntosh (2022)
5.	Access to Tax Incentive	Zhu *et al*. (2023); Nanda (2023)
6.	Reduce Tenant Turnover	Lin (2024); Vonlanthen (2024); Zhao (2023); Bowen *et al*. (2024)
7.	Improved Reputation	Zhan (2023); Olteanu and Ionascu (2023); Wang and Wang (2024); Shapsugova (2023); Izyumov (2023)
8.	Access to Green Financing	Liang and Yang (2024); Roy (2023); Li, Hu and Hong (2024); Fu, Lu and Pirabi (2023); Li, Zhang and Solangi (2023)
9.	Promote Transparency and Trust	McCabe (2023); Wang and Wang (2024); Bowen *et al*. (2024)

Table 2.1 (Continued)

No.	Importance	Previous Studies
10.	Risk Mitigation	Olteanu and Ionascu (2023); Gonzalez (2024); Wang and Wang (2024); Shapsugova (2023); Ghosn, Warren-Myers and Candido (2024); Izyumov (2023)
11.	Waste Conversation	Biswakarma *et al*. (2024); Jamaludin and Razali (2024); Wang and Xue (2023); Ghosn, Warren-Myers and Candido (2024)
12.	Provide Affordable Housing	Morawakage *et al*. (2023); Walacik and Chmielewska (2024); Zhao (2023)
13.	Legal Protection	Shapsugova (2023); Wang and Xue (2023); Zhao (2023)
14.	Improved Safety and Security	Riratanaphong and Pewklieng (2025); Olteanu and Ionascu, (2023); Jamaludin and Razali (2024)
15.	Enhanced Water Efficiency	Obushnyi and Novikov (2024); Wang and Wang (2024); Zhao (2023)
16.	Preserve Natural Resource	Kandpal *et al.* (2024); Wang and Xue (2024); Jiang *et al*. (2023)
17.	Reduce Social Problem	Chen (2023); Wang and Xue (2023); Bowen *et al*. (2024)
18.	Cost Reduction	Shen *et al*. (2023); Gonzalez (2024); Wang and Wang (2024); Shapsugova (2023); Izyumov (2023); Zhao (2023)

2.4 Importance of Incorporating ESG Practices from Building Occupants' Perspective

The importance of incorporating ESG practices from the perspective of building occupants is crucial, as these practices have a direct impact on their living environments. The well-being, satisfaction, and overall quality of life of occupants are closely linked to how effectively ESG considerations are integrated into buildings. Table 2.1 summarises the importance of incorporating ESG practices as identified in previous studies. In the following subsection, the significance of incorporating ESG practices from the perspective of building occupants is elucidated extensively.

2.4.1 Enhanced Health and Well-Being

Indoor air quality (IAQ) is essential for maintaining the health and well-being of building occupants, significantly affecting their physical comfort and overall productivity (Kaushik *et al*., 2022; Ifediora and Nwosu, 2024). Mansor *et al*. (2024) and Narubayeva (2021) buttressed this further by claiming that the poor IAQ significantly associated with Sick Building Syndrome (SBS), leading to severe discomfort, adverse health effects, and decreased productivity among building occupants. Given that occupants spend 90% of their time indoors, ensuring good IAQ is fundamental for creating healthy living and working environments (Manna and Al-Ghamdi, 2021). In this regard, IAQ is a crucial aspect of ESG practices, as it directly affects the well-being and satisfaction of building occupants, ultimately contributing to sustainable living (Wang and Xue, 2023).

As illustrated by Cecconi, Barazzetti and Bonacci (2024); Ahmed (2022), ESG practices improve IAQ through efficient ventilation, energy-efficient HVAC systems, and the use of sustainable materials. These practices have translated into reduced exposure to pollutants and overall improvement in the building environment, thereby advancing the health and comfort of building occupants. Furthermore, enhancing IAQ can contribute to buildings achieving WELL certification, a standard focused on health and well-being in indoor environments (Licina and Langer, 2021). This certification can increase building's marketability and attract tenants who prioritise ESG principles for

building owners (Valero, 2025). Thus, IAQ not only essential for occupant health but also provides long-term benefits for both building owners and tenants.

2.4.2 Improved Energy Efficiency

Energy-saving features are crucial in residential developments to combat excessive appliance usage. This is because residential areas often exhibited high levels of electrical appliance usage, leading to increased energy consumption and costs (Paurnami, 2020). Additionally, many older buildings were not designed with energy efficiency in mind, resulting in excessive energy consumption, higher CO_2 emissions, and escalating operational costs (Arun *et al*., 2024; Bera *et al*., 2024). This inefficiency not only negatively impacts the environment but also hinders efforts toward sustainable development, affecting both the building's sustainability and the well-being of its occupants. Consequently, Sun *et al*. (2024) averred that improved energy-efficient within the framework of ESG principles is essential for addressing these issues.

Bera *et al*. (2024) attested that energy-efficient buildings often incorporated features like better ventilation, natural lighting, and thermal comfort, all of which contributed to better occupant health and well-being. Wang, Wang and Norback (2022) further supported this, noting that energy efficiency measures not only fostered a more comfortable indoor environment but also helped reduce the risk of health issues, such as respiratory problems, which were often worsen by poor air quality. Simultaneously, energy-efficient buildings contributed to a cleaner environment by reducing electricity consumption, lessening reliance on fossil fuels, and ultimately decreasing greenhouse gas emissions (Hafez *et al*., 2023). In line with this, the reduced energy consumption translated into lower energy bills, providing financial savings for building occupants (Papadakis and Katsaprakakis, 2023).

2.4.3 Increased Marketability and Demand

The property market in Malaysia has faced a significant overhang, with an excess of supply relative to demand (Sebri, 2022). This oversupply has affected the marketability of properties, particularly for building occupants, by potentially lowering prices and making it more difficult to sell or rent properties (Veres, 2024). As the property market become more saturated, occupants have

increasingly sought properties that meet higher environmental and social standards (Heffernan *et al*., 2020). This shift in preferences has reflected the growing demand for more sustainable spaces, making it crucial for building owners to incorporate ESG practices to increase marketability in order to meet tenant expectations (Ober, 2024).

Wong and Chan (2024) observed a growing disparity between the rising demand for ESG-compliant buildings and the limited supply of such properties. This created a key opportunity for building owners to address this gap and improve their buildings to meet the increasing demand for sustainable spaces. By implementing ESG practices, building owners could not only attract new tenants but also retain them over the long term, thereby securing a competitive advantage in the market (Zhao, 2023; Wen *et al*., 2020). On top of that, Erin (2023) contended that properties that embraced ESG practices were associated with lower operational costs, improved health and well-being, and a stronger sense of community, making them more appealing to prospective tenants. Therefore, incorporating ESG practices into real estate developments became a strategic decision that enhanced the demand for properties by aligning them with the evolving expectations of modern tenants.

2.4.4 Increased Property Value

According to Johnson and Miller (2022), incorporating ESG practices into properties can boost property value. Primarily, buildings incorporating ESG practices, such as energy-efficient systems, sustainable designs, and social responsibility initiatives, have become increasingly attractive to tenants who prioritise sustainability and social responsibility (Sharma, 2024). This growing preference has led to higher property values, as tenants are more likely to stay in properties that align with their values (Scherrenberg, Wessels and Nelisse, 2024). A study by Olteanu and Ionascu (2023) also found that 42% of respondents agreed that ESG measures can increase property value, further highlighting the financial benefits of ESG integration.

In addition to enhancing tenant satisfaction, ESG practices were also beneficial in reducing operational costs, thereby increasing the overall value of a property (Scherrenberg, Wessels and Nelisse, 2024). To clarify further, ESG practices emphasise that energy-efficient designs and waste reduction initiatives

were particularly effective in lowering utility costs (Yap, Leow and Goh, 2024; Cook *et al*., 2024). Consequently, Gholamzadehmir *et al*. (2025) propounded that these energy efficiency improvements could increase the price of residential assets by between 3% and 8%. Thus, integrating ESG practices into property has proven to be a strategic decision that not only enhances property value but also aligns with the long-term financial goals of building occupants (Coulson *et al*., 2025).

2.4.5 Access to Tax Incentive

The government of Malaysia raised the Sales and Service Tax (SST) from 6% to 8% (Ikram, 2024), leading to higher expenses associated with property acquisition. This increase in costs has prompted potential buyers to exercise caution in their purchasing decisions, as affordability has been significantly impacted (Kathy, 2024). In response, the incorporation of ESG practices into properties has become an important strategy to offset these rising costs. Zhu *et al*. (2023) expounded that governments worldwide have introduced tax incentives to encourage individuals to comply with ESG standards, thereby mitigating the financial burden of implementing sustainability-focused initiatives for building occupants.

Apart from that, ESG practices offer significant financial benefits, particularly through tax incentives. Under Malaysia's Budget 2024, building owners can claim tax deductions of up to RM50,000 for ESG-related expenses, such as ESG reporting and sustainability initiatives (Lembaga Hasil Dalam Negeri Malaysia, 2023). Additionally, owners can receive up to RM2,500 in tax relief for providing electric vehicle (EV) charging facilities and deductions for EV rental costs. These incentives not only reduce the financial burden on building owners but can also benefit tenants in the form of lower rents and improved amenities (Li, Lai and How, 2022). Thus, ESG practices not only enhance the property's environmental impact but also make it more financially attractive for tenants, offering both cost savings and sustainable living solutions (Cermakova and Hromada, 2022).

2.4.6 Reduced Tenant Turnover

Tenant turnover refers to the situation where tenants decide not to renew their leases and vacate the property. Khan (2024) pointed out that high tenant turnover can negatively impact property management, leading to reduce rental income, extend vacancy periods, and increase costs for property preparation and cleaning. In response, incorporating ESG practices has become crucial, as it enhanced tenant satisfaction, thereby leading to higher retention rates and reduced vacancy costs (Nethercote *et al*., 2023). This can be supported by Liu (2024) that ESG practices not only increased property values but also improved tenant satisfaction and lease renewal rates. These findings are consistent with Wijayaningtyas, Handoko and Hidayat (2019), who mentioned that ESG-compliant buildings in Greater Kuala Lumpur had higher occupancy rates, ranging from 80% to 90%, compared to non-ESG-compliant buildings.

Moreover, buildings with strong ESG practices resulted in lower utility bills and reduced maintenance costs for tenants, which significantly contributed to their overall satisfaction and helped reduce turnover (Sharma, 2024). This is because ESG practices typically involved the implementation of energy-efficient technologies and sustainable operations, which lowered energy consumption (Barykin *et al*., 2022). These cost-saving measures not only improved tenant satisfaction but also created a more comfortable and environmentally friendly living environment for building occupants. As a result, tenants were less likely to leave, which led to a decrease in turnover rates.

2.4.7 Improved Reputation

Zhan (2023) emphasised that there is a direct relationship between ESG performance and reputation. In this vein, Meng *et al*. (2023) asserted that strong ESG performance can significantly boost a property's overall reputation by effectively addressing the needs and expectations of its occupants. Yang and Tian (2022) further supplemented that the reputation of a property plays a crucial role in shaping tenants' decision-making, as tenants are more likely to stay in properties that reflect their personal values of sustainability and social responsibility. Consequently, implementing ESG practices can significantly enhances the reputation of buildings (Riratanaphong and Pewklieng, 2025).

Moreover, the improved reputation resulting from strong ESG practices offers significant long-term benefits for tenant retention and loyalty. Olteanu and Ionascu (2023) revealed that 75% of respondents agreed that the implementation of ESG practices enhances a property's reputation, reinforcing its market appeal. In addition, Cole, Coleman and Scannell (2021); Chia *et al.* (2016) argued that properties with strong ESG performance gain prominence due to their positive image and distinctive features, attracting tenants seeking both quality and sustainability. This is because ESG practices often translated into better operational efficiency, reduced environmental impact, and improved social responsibility, which are increasingly valued by tenants (Salleh *et al*., 2019). Consequently, Wong and Chan (2024) revealed that buildings with a strong ESG reputation are more likely to attract and retain tenants over the long term.

2.4.8 Access to Green Financing

Green financing is essential for supporting sustainable projects across multiple sectors. It encompasses various forms, such as green loans, bonds, mortgages, and other financial products specifically designed to support environmentally friendly initiatives (Idris *et al*., 2024). Bank Negara Malaysia (2022) disclosed that 91% of banks offer green products or services, highlighting the growing trend of green finance products in Malaysia. This shift has been particularly beneficial for building occupants who aim to integrate ESG practices into their living environments. This is due to the fact that Malaysians have been experiencing difficulties in obtaining housing loans (Hassan, Ahmad and Hashim, 2022; Kamal *et al*., 2024). Hence, building occupants who have incorporated ESG practices can significantly benefit from green financing (Habib *et al*., 2025; Meng and Hao, 2024; Kassi and Li, 2025).

Akomea-Frimpong *et al*. (2022) stated that green mortgages offer lower interest charges. This reduction in interest rates has led to substantial savings for building occupants, resulting in lower monthly loan payments (Kosareva and Polidi, 2020). In light of this, Gulzhan *et al.* (2023) revealed that green loans support environmental initiatives such as the installation of solar panels. This financial support has enabled building occupants to adopt ESG practices at a reduced cost, making it easier for them to invest in renewable

energy solutions (Wijaya and Kokchang, 2023). Under such conditions, green financing has empowered occupants to integrate energy-efficient technologies, improving both the environmental footprint and the financial viability of their homes. concepts, including the benefits, risks, and available options.

2.4.9 Promote Transparency and Trust

Transparency in this study refers to the clear and honest disclosure of relevant information, allowing building occupants to make informed decisions. Barnett *et al*. (2020) and Ionascu and Anghel (2020) mentioned that large portions of the world continue to experience low levels of real estate transparency. Similarly, Nijland and Veuger (2019) have identified transparency as a major challenge within the real estate industry. This lack of transparency results in limited visibility for building occupants, particularly in transactions such as leasing, buying, and selling (Olapade and Olaleye, 2019). As a result, ESG practices are essential in promoting transparency and trust in all dealings (McCabe, 2023).

Olteanu and Ionascu (2023) and Lim, Oh and Ngayo (2023) have emphasised that transparency is vital for effectively communicating ESG practices, which ensures that tenants feel confident in the property's environmental and social performance. Liu *et al*. (2024) also alleged that transparency within ESG practices not only promotes fairness, trust, and integrity in real estate transactions but also strengthens the overall relationship between building occupants. Consequently, when building owners disclosed ESG performance data, it build trust and accountability, making tenants more likely to renew their leases and recommend the property (Mironiuc *et al*., 2021). Eventually, promoting transparency through ESG practices has been crucial for fulfilling tenants' needs and fostering long-term relationships that enhance tenant retention and ensure the property's continued success.

2.4.10 Risk Mitigation

The real estate market has remained uncertain due to the complex interaction of numerous variables, such as economic conditions, social trends, demographic shifts, and technological advancements (Dobrovolska and Fenenko, 2024). These factors interacted in intricate ways, making it difficult to predict market

trends with accuracy. Moreover, the continuous evolution of environmental regulations has added to this uncertainty, as new standards and policies have emerged (Zhu *et al*., 2021). In light of this, incorporating ESG practices into development has been crucial for mitigating associated risks (Abramova, 2024). Olteanu and Ionascu (2023) further contended that ESG practice can lower regulatory risk, operational risk, and reputational risk.

Shapsugova (2023) claimed that ESG practice ensure that buildings comply with current environmental regulations and standards. This is because ESG practices focused on energy efficiency and sustainable materials reduce carbon footprint and operational costs, which in turn lowers environmental risks and operational risk (Wang and Xue, 2023). Moreover, ESG practices mitigate the risk of future regulatory changes (Yebenes, 2024). As a result, these practices reduces the risk of legal penalties, fines, and other regulatory challenges. Further, ESG practices helps to mitigate social risks by ensuring inclusivity, security, and overall well-being for all building occupants (Semet, 2020).

2.4.11 Waste Conservation

The residential sector, consisting of building occupants, is a primary source of municipal solid waste (MSW) in Malaysia (Fadhullah *et al*., 2022). A significant portion of the waste entering landfills in Malaysia is composed of recyclable materials, with estimates ranging from 70% to 80% of the total waste (Shakil, Azhar and Othman, 2023). In response, the government has implemented policies and regulations to improve waste management, including increased recycling efforts and waste separation initiatives (Tang *et al*., 2021). This aligns with the importance of ESG practices, as they prioritise effective waste management (Biswakarma *et al*., 2024).

Gholian-Jouybari *et al*. (2024) and Chong (2024) highlighted that ESG practices involve the 3R (reduce, reuse, and recycle) approach in waste management. By implementing these practice, it decreases the use of landfills and incineration, the use of landfills and incineration is decreased, which in turn lowers the emissions of carbon monoxide and methane into the atmosphere (Dixit and Srivastace, 2024). This reduces exposure to harmful substances and pollutants, thereby contributing to a healthier indoor environment for building

occupants. Furthermore, recycling and composting practices help lower disposal costs and reduce the frequency of waste collection (Kihila, Wernsted and Kaseva, 2021). These cost savings may result in lower dumping fees for occupants (Okwandu *et al*., 2024). Hence, integrating ESG practices not only promotes environmental sustainability but also enhances economic benefits and improves the health and well-being of building occupants.

2.4.12 Provided Affordable Housing

The demand for affordable housing in Malaysia has been steadily rising (Majid *et al*., 2023). The growing gap between property price growth and household income growth is a significant factor contributing to the issue. Ho (2024) underlined that the compound annual growth rate (CAGR) for property prices and household income in Malaysia from 2012 to 2022 was 7.5% and 5.7%, respectively. This disparity indicates that property prices are rising faster than incomes, making it increasingly difficult for building occupants to afford homes. Eng (2021) further stressed that the government's affordable housing scheme has been ineffective in addressing this imbalance. Therefore, incorporating ESG practices is crucial as these practices prioritize providing affordable housing options for individuals and families across various income levels (Morawakage *et al*., 2023).

ESG practices often involve energy-efficient designs and the use of sustainable building materials (Yap, Leow and Goh, 2024). These practices can significantly reduce operational costs and long-term maintenance expenses, making affordable housing projects more economically viable (Lin, 2024). Additionally, sustainable materials are resilient, long-lasting, and require minimal maintenance (Nilimaa, 2023), further enhancing the overall affordability of living in these spaces (Mjornell, Platten, and Bjorklund, 2022). Moreover, Lionel *et al* (2023) stated that ESG practices prioritize social equity by focusing on the provision of affordable housing for all occupants. This approach encourages developers to allocate a substantial portion of their housing stock to lower-income residents. As a result, incorporating ESG practices is essential as it helps to ensure more affordable housing options and promotes inclusivity within communities.

2.4.13 Legal Protection

Governments have increasingly enacted and enforced stricter regulations to promote sustainability, including environmental laws and by-laws (Voland, Saad and Eicker, 2022). This trend has been driven by increasing concerns about environmental degradation, the urgency to address climate change, and the growing recognition that sustainability is vital for long-term economic and social well-being (Hariram *et al*., 2023). For example, in Malaysia, the Environmental Quality Act 1974 regulates pollution and aims to protect the environment (Rizal *et al*., 2024). In this regard, implementing ESG practices helps properties comply with these stringent sustainability regulations and by-laws, thereby protecting building occupants from potential legal liabilities.

Shapsugova (2023) and Akinsola (2025) stressed that ESG practices, such as using sustainable materials and improving energy efficiency, have enabled building owners to mitigate risks related to non-compliance and potential legal penalties. Furthermore, prioritising occupant health and safety through improved indoor air quality and waste management helped reduce the likelihood of lawsuits related to health hazards (Dixit and Srivastace, 2024). These practices also enhanced a building's resilience to climate change, thereby reducing the risks of property damage and liabilities for occupants (Newell, Nanda and Moss, 2023). Additionally, the governance practices within ESG frameworks, such as transparent management and fair treatment of tenants, minimised the risks of fraud and mismanagement (Nicolo, 2020; Chisholm, Howden-Chapman and Fougere, 2020). This strengthened the property's reputation and builds trust among tenants (Zyznarska-Dworcza, 2022). Consequently, these integrated ESG practices ensured a safer and more legally secure environment for all building occupants.

2.4.14 Improved Safety and Security

Property crimes have accounted for 85% of the index crimes in Malaysia (Muhamad, Yusof and Misiran, 2021). This high crime rate has created significant concerns for building occupants, who often feel anxious about their safety, both inside and outside their homes (Sheppard *et al*, 2022; Wang and Wang, 2023). As a result, this sense of insecurity has contributed to higher turnover rates, with tenants often choosing to relocate to areas they perceive as

safer (Gomory and Desmond, 2023). In light of this, the incorporation of ESG practices has become increasingly important, as these practices have been shown to enhance the safety and security of building occupants (Olteanu and Ionascu, 2023).

ESG practices have often involved the integration of advanced safety features into building designs. These measures have included the installation of modern security systems, such as surveillance cameras, access control mechanisms, alarm system and emergency communication tools (Riratanaphong and Pewklieng, 2025; Salaam, 2023). Moreover, ESG practices also emphasised climate resilience, ensuring that buildings are equipped to withstand emergencies, such as floods, thereby enhancing overall occupant safety (Srirangan and Sheng, 2024). These safety measures not only ensure compliance with legal standards but also provide peace of mind to tenants. As a result, the integration of ESG practices has contributed significantly to tenant well-being and safety, leading to a reduction in turnover rates (Dong *et al*., 2023).

2.4.15 Enhanced Water Efficiency

Malaysia has experienced significant water security concerns, primarily driven by a growing population, river pollution, overconsumption, climate change, and unsustainable land use (Jefri and Shaadan, 2024). Shahangian *et al*. (2022) further asserted that excessive water usage in residential sectors has contributed to water scarcity. Consequently, the incorporation of ESG practices has been crucial, as they have significantly enhanced water efficiency (Panteleev *et al*., 2024). Furthermore, the installation of smart water monitoring systems through ESG practices has enabled early leak detection, which prevents wastage and ensures efficient resource use (Mdoda *et al*., 2024). By conserving water, occupants have become more resilient to shortages, ensuring a stable supply and minimising disruptions to daily activities.

Moreover, Obushnyi and Novikov (2024) found that ESG practices support water conservation by promoting the use of water-efficient fixtures, rainwater harvesting, and greywater recycling, all of which have significantly reduced overall water consumption. This has allowed tenants to benefit from lower water bills, thereby improving the affordability of living (Cooley,

Shimabuku and DeMyers, 2022). This has been particularly beneficial for low-income residents, alleviating financial burdens related to water use. Therefore, integrating water efficiency into ESG practices has been essential, not only for enhancing the financial viability of properties but also for providing occupants with a healthier and more sustainable living environment.

2.4.16 Preserved Natural Resource

Human activities such as over-exploitation, deforestation, and land conversion for agriculture have contributed significantly to the depletion of natural resources (Wang and Azam, 2023). In this regard, reducing consumption, especially of water and energy, has become crucial to ensure resource availability for future generations (Zhang, 2023). Hopkins (2023) further clarified that incorporating ESG practices can directly benefit tenants by promoting resource conservation through the adoption of energy-efficient appliances, such as LED lighting, and water-saving technologies. These measures have directly translated into lower utility bills for occupants and contributed to a smaller environmental footprint by reducing greenhouse gas emissions (Olatunde, Okwandu and Akande, 2024).

Moreover, ESG practices have encouraged the use of eco-friendly materials, which can significantly reduce the environmental impact of buildings (Yap *et al*., 2024). By replacing finite resources with recyclable and sustainable materials, the demand for virgin resource extraction is minimised, contributing to natural resource preservation (Yap, Leow and Goh, 2024). Additionally, eco-friendly materials often have lower embodied carbon, resulting in fewer greenhouse gas emissions during production and transportation (Gupta *et al*., 2021). Myint and Shafique (2024) supplemented that using such materials can cut embodied carbon by 40% and transportation emissions by 39%, compared to conventional materials. Ultimately, incorporating ESG practices have led to a reduction in the overall carbon footprint of buildings, contributing to a healthier, more sustainable environment for building occupants

2.4.17 Reduced Social Problem

ESG practices are designed to ensure fair access to opportunities for everyone, regardless of gender, socioeconomic status, or disability. As highlighted by Chen (2023), ESG practices encourage universal design features such as barrier-free access, senior-friendly infrastructure, and wheelchair-accessible facilities, which foster inclusivity and improve the quality of life for all building occupants. Additionally, incorporating ESG practices is crucial as it prioritise providing affordable housing options for individuals and families across various income levels (Morawakage *et al*., 2023). This helps to reduce economic segregation and encourages social diversity, thus contributing to a more equitable society (Ariaee and Takalloo, 2024).

Furthermore, ESG initiatives often incorporate community-oriented features such as public parks, green spaces, and shared facilities to enhance social well-being and create a sense of belonging among residents (Riratanaphong and Pewklieng, 2025). These elements not only foster stronger community bonds but also ensure that building comply with fair housing regulations, preventing discrimination in property access. Moreover, the governance frameworks associated with ESG practices support ethical property management by ensuring transparency in pricing, safeguarding tenant rights, and providing equitable access to financing (Mironiuc *et al*., 2021; Liu *et al*., 2024). Thus, the integration of ESG practices significantly helps in addressing social issues, ensuring inclusivity, and promoting fairness in housing developments.

2.4.18 Cost Reduction

Shen *et al*. (2023) and Brown *et al*. (2020) investigated that ESG practices, including energy efficiency technology such as light emitting diodes (LED) can lower electricity costs and minimise environmental footprint. The energy-efficient technologies will involves significant initial costs; however, it offers the potential for substantial long-term savings (Hou and Zhang, 2024). Moadab *et al*. (2021) enunciated that LED lighting demonstrated the lowest energy consumption compared to traditional lighting in residential environments. In addition, Ariffin and Eleyan (2021) reported that implementing energy-efficient

measures, such as LED lighting, can reduce annual expenses for occupants by 60%.

Furthermore, improving water efficiency through ESG practices has been found to lead to cost savings for occupants. Adithya *et al.* (2022) discovered that water-efficient technologies can reduce water consumption by 40% to 80% compared to conventional buildings. Sunar *et al*. (2019) have further demonstrated that implementing rainwater harvesting systems can lower water bills by approximately RM210 annually in residential buildings. Additionally, integrating rooftop solar photovoltaic (PV) systems has been shown to provide up to 66% cost savings per year (Khairi, Akimoto and Okajima, 2022). Thus, incorporating ESG practices has proven to directly benefit building occupants by reducing their operational costs, making them a key strategy for long-term financial sustainability (Balzarini and Boyd, 2021).

Table 2.2: Previous Studies on ESG Criteria from a Building Occupant's Perspective.

No.	Criteria	Previous Studies
	Environmental Criteria	
1.	Energy Efficiency	Zatonatska *et al* (2024); Sun *et al* (2024); Jamaludin and Razali (2024); Wang and Xue (2023); Hopkins (2023)
2.	Waste Management	Billio *et al*. (2021); Olteanu and Ionascu (2023); Ghosn, Warren-Myers and Candido (2024); Jamaludin and Razali (2024); Gholian-Jouybari *et al*. (2024); Newell and Marzuku (2022)
3.	Water Conservation	Gonzalez (2024); Olteanu and Ionascu (2023); Ghosn, Warren-Myers and Candido (2024); Jamaludin and Razali (2024); Newell and Marzuku (2022); Walacik and Chmielewska (2024)
4.	Sustainable Material	Yap, Leow and Goh (2024); Wang and Xue (2023); Ifediora and Nwosu (2024); Jamaludin and Razali (2024); Cruz *et al*. (2023)
5.	Biodiversity Protection	Kopnina *et al*. (2024); Ghosn, Warren-Myers and Candido (2024); Jamaludin and Razali (2024); Bo and Battisti (2024)
6.	Carbon Management	Jamaludin and Razali (2024); Olteanu and Ionascu (2023); Gonzalez (2024); Newell and Marzuki (2022)
7.	Encourage Green Rating Tool	Cecconi, Barazzetti and Bonacci (2024); Sjoberg and Ostling (2024); Penati (2022); Adewumi, Opoku and Dangana (2024); Zhao (2023); Ifediora and Igwenagu (2024)

Table 2.2 (Continued)

No.	Criteria	Previous Studies
8.	Public Transport Usage	Nicolo (2020); Ifediora and Igwenagu (2024); Alatagi, Dwivedi and Bhavsar (2021); Scherrenberg, Wessels and Nelisse (2024)
9.	Adopt Green Lease	Wong and Chan (2024); Zhao (2023); Tosun (2024)
	Social Criteria	
1.	Indoor Air Quality	Riratanaphong and Pewklieng (2025); Hopkins (2023); Robinson and McIntosh (2022); Ifediora and Igwenagu (2024)
2.	Natural Lighting	Trehan (2024); Kempeneer, Peeters and Compernolle (2021); Chaturvedi (2024)
3.	Thermal Comfort	Robinson and McIntosh (2022); Gonzalez (2024); Kempeneer, Peeters and Compernolle (2021)
4.	Noise Disturbances	Kempeneer, Peeters and Compernolle (2021); Pimentel (2023); Robinson and McIntosh (2022)
5.	Safety and Security	Olteanu and Ionascu (2023); Jamaludin and Razali (2024); Ghosn, Warren-Myers and Candido (2024); Ifediora and Igwenagu (2024)
6.	Community Engagement	Ghosn, Warren-Myers and Candido (2024); Chaturvedi (2024); Olteanu and Ionascu (2023)
7.	Social Inclusion	Bozic (2023); Ghosn, Warren-Myers and Candido (2024); Chaturvedi (2024)
8.	Affordable Housing	Zhao (2023); Hamis (2024); Jalil *et al.* (2025)

Table 2.2 (Continued)

No.	Criteria	Previous Studies
	Governance Criteria	
1.	Transparency	Jamaludin and Razali (2024); Ghosn, Warren-Myers and Candido (2024); Ifediora and Nwosu (2024); Ifediora and Igwenagu (2024); Chaturvedi (2024); Olteanu and Ionascu (2023)
2.	Risk Management	Yebenes (2024); Meng and Shaikh (2023); Jamaludin and Razali (2024); Ifediora and Nwosu (2024); Robinson and McIntosh (2022); Ifediora and Igwenagu (2024)
3.	Stakeholder Engagement	Shapsugova (2023); Ifediora and Nwosu (2024); Newell, Nanda and Moss (2023)
4.	Ethical Conduct	Ifediora and Igwenagu (2024); Jamaludin and Razali (2024); Olteanu and Ionascu (2023); Ghosn, Warren-Myers and Candido (2024)
5.	Accountability	Olteanu and Ionascu (2023); Ifediora and Nwosu (2024); Ifediora and Igwenagu (2024)
6.	Corporate Social Responsibility	Jamaludin and Razali (2024); Robinson and McIntosh (2022)

2.5 Criteria of Incorporating ESG Practices from Building Occupants' Perspective

ESG criteria in real estate are used by stakeholders to evaluate a property's sustainability and ethical impact (Olteanu and Ionascu, 2023). These criteria help assess a property's environmental footprint, social impact on communities, and governance structures. Table 2.2 summarises the criteria of incorporating ESG practices based on previous studies. Accordingly, this section examines the ESG criteria from the perspective of building occupants.

2.5.1 Environmental Criteria

The environmental aspect of ESG criteria concentrates on a property's ecological impact and sustainability practices throughout its lifecycle. It includes managing natural resources to satisfy present needs without compromising the ability of future generations to meet theirs. This involves evaluating a property's energy consumption, waste management, water usage, and its overall role in climate change mitigation and adaptation.

2.5.1.1 Energy Efficiency

Energy-efficient technologies were identified as one of the key criteria for the environmental pillar of ESG practices (Wang and Xue, 2023). Velaoras *et al.* (2025) asserted that building occupants played a crucial role in energy efficiency within the ESG framework by understanding and utilising the building's energy-saving technologies, such as LED lighting, efficient HVAC systems, and water-saving fixtures. By engaging in this knowledge and proactive participation, occupants significantly reduced energy consumption while aligning with ESG goals. Jin *et al.* (2020) further emphasised that integrating occupant behavior with energy-efficient technologies substantially reduced a building's energy use. However, Harputlugil and Wilde (2021) argued that promoting energy-efficient technologies alone was insufficient to address the broader challenges of environmental pollution and excessive energy consumption. Consequently, Clements (2020) highlighted that simple actions, such as turning off lights when not in use, reduced energy consumption by up to 20%.

Beyond individual actions, building occupants advocated for energy-efficient improvements in building infrastructure (Reutter, 2024). This included supporting renovations that incorporated energy-efficient systems and renewable energy sources, such as solar panels (Mantyla, 2025). These technologies not only contributed to environmental sustainability but also enhanced a building's resilience to climate change. Furthermore, ESG practices include the implementation of high-efficiency HVAC systems to improve indoor air quality while reducing energy consumption (Noga, 2024). By incorporating such measures, energy consumption can be reduced by 10% to 40% within a building (Sofos *et al.,* 2020).

2.5.1.2 Waste Management

The incorporation of clear and structured waste management criteria is essential in driving the effective implementation of ESG practices, particularly from a building occupant's perspective. Riratanaphong and Pewklieng (2024) emphasised the importance of criteria that promote waste minimisation, segregation, and recycling to enhance sustainability. According to Sharma and Jain (2020), individuals generated approximately half a tonne of waste annually, which further highlighted the need for actionable criteria in waste management systems. In addition, poor waste practices often leading to issues such as odors, pest infestations, and unsanitary conditions (Qasim *et al*., 2020). Consequently, ESG practices must include criteria for reducing waste generation, such as implementing waste segregation systems, and enhancing waste disposal methods (Olteanu and Ionascu, 2023; Billio *et al*., 2021).

Moeini *et al*. (2023) unfolded that integrating occupant behavior with clear waste management criteria and effective waste segregation can significantly reduce environmental pollution. Nguyen *et al*. (2023) reinforced this by demonstrating that waste segregation that implemented effectively can significantly reduce waste volume by over 60%. Furthermore, ensuring convenient access to recycling bins and incentivising participation can increase recycling rates, contributing to the overall success of sustainable waste management (Rosenthal and Linder, 2021; Etim, 2024). ESG practices also incorporate criteria to reduce single-use products, encourage the reuse of materials, and promote recycling, all of which mitigate environmental pollution

and foster a healthier and more sustainable living environment for building occupants (Yusoff and Asmuni, 2021; Bouabdallaoui, 2024; Muiruri, 2022).

2.5.1.3 Water Conservation

According to Olteanu and Ionascu (2023), water conservation is a critical ESG criterion. Building occupants can implemented technical solutions, such as low-flow fixtures and smart water management systems, to reduce water usage and ensure sustainable consumption (Sunny, 2024). These systems allow for efficient monitoring, leak detection, and timely repairs, minimizing waste. The greywater recycling and rainwater harvesting, as outlined by Salehi (2022), further contributed to sustainable water management by allowing water to be reused for non-drinking purposes such as irrigation and flushing toilets. Additionally, CBRE (2023) discovered that 41% of building occupants are willing to pay extra for features that help lower water usage, reflecting an increasing interest in sustainable building solutions.

Beyond technical solutions, engaging occupants in water conservation is equally important (Esmaeilishirazifard *et al*., 2024). Nguyen *et al.* (2023) and Lakhiar *et al*. (2024) found that educating building occupants on water-saving behaviors, such as turning off taps when not in use and taking shorter showers, can significantly reduce water consumption. Besides, Vorobeva *et al*. (2022) found that offering incentives for water conservation can further promote sustainable behaviors. Hohne, Kusakana and Numbi (2019) and Kumar and Thakur (2024) asserted that transitioning to energy-efficient systems, such as thermal solar water heaters, reduces both water heating costs and reliance on non-renewable energy sources. Additionally, water-efficient technologies like waterless urinals and leak detection systems support ESG criteria by optimising water usage and reducing operational costs (Randall and Koech, 2019). Collectively, these criteria help foster a sustainable living environment for building occupants while ensuring long-term resource conservation.

2.5.1.4 Sustainability Material

Wang and Xue (2023) discovered the use of sustainability materials should be implemented as part of the ESG criteria. This is because ESG emphasised the use of low-emission materials, such as paints, sealants, and adhesives that

emitted fewer VOCs (Ahmed, 2022). As a result, reducing VOCs contributed to better respiratory health and overall well-being for building occupants. Furthermore, ESG criteria also emphasised sustainable certifications such as LEED, which ensured that materials met recognised sustainability standards (Wang and Xue, 2023). By incorporating these criteria, building occupants were able to reduce harmful chemical exposure and promote a healthier indoor environment. Apart from that, Yap, Leow and Goh (2024) stated that ESG practices focused on the selection of materials with lower embodied energy to reduce the environmental impact. This indicated a focus on materials that required less energy to produce, transport, and install, thereby reducing the overall carbon footprint of a project. Thus, the use of sustainable materials was one of the ESG practices as it reduced harmful chemical exposure and provided a healthier environment for building occupants.

2.5.1.5 Biodiversity Protection

Biodiversity protection in this study referred to preserving and enhancing the natural habitats within or around the property. Kopnina *et al*. (2024) highlighted the integration of biodiversity is one of the ESG metrics. This involved using efficient construction methods to minimize material waste, choosing sustainable materials with recycled content, and selecting prefabrication to reduce waste during construction and demolition phases (Song *et al*., 2024). Obushnyi and Novikov (2024) advocated that ESG practices emphasised the use of water-efficient fixtures, optimizing energy use through energy-efficient appliances, and adopting renewable energy sources like solar panels, all of which contributed to minimizing environmental impact.

Wooster *et al.* (2022) stated that integrating green design features, such as green roofs, walls, and landscaping elements, was an essential part of the ESG criteria for fostering biodiversity. These features not only provided shelter, food, and breeding grounds for various species but also enhanced biodiversity while fostering a stronger connection between occupants and the natural environment (Wooster *et al*., 2022). The green space can also be utilised through landscaping methods like dense foliage tree planting, rooftop planting and vertical greenery. Furthermore, sustainable water management was also integral to ESG criteria as it helped maintain local ecosystems. Chen and Song (2024)

found that practices such as rainwater harvesting and the use of permeable pavements reduced water runoff, improved water quality, thereby benefiting surrounding biodiversity by maintaining natural hydrological cycles. Meanwhile, the material selection involved choosing sustainable building materials, such as recycled materials or locally sourced timber, to reduce environmental damage to ecosystems during construction (Albinsson and Larsson, 2023).

2.5.1.6 Carbon Management

Yang *et al.* (2020) explained that building occupants were significant sources of indoor CO_2, with the amount of CO_2 generated being influenced by their physical activities. Baratta *et al.* (2023) further supplemented that the criteria for incorporating ESG practices involved carbon management. Therefore, promoting energy-efficient habits like turning off lights and using energy-efficient appliances is vital for reducing carbon emissions (Kljajic, 2023). Additionally, fostering water conservation and waste reduction behaviors, while educating occupants on the environmental impact of their actions, further contributed to minimising overall carbon emissions (Owojori and Anwana, 2024).

Building operations were equally important in achieving effective carbon management within ESG practices. This included implementing energy-efficient systems, such as lighting, HVAC systems, and other equipment, that aligned with the criteria for reducing carbon emissions (Yin, 2023). Moreover, integrating renewable energy sources, like solar panels and optimising building performance through smart technologies contributed to lowering energy consumption and carbon emissions (Leong, 2024; Khalufi *et al*., 2025). Zhao (2023) also emphasised that utilising technologies like solar photovoltaic (PV) systems was a crucial component in achieving sustainability in buildings, which significantly lowered greenhouse gas emissions while improving energy efficiency and occupant well-being.

2.5.1.7 Encourage Green Rating Tool

Riratanaphong and Pewklieng (2025) mentioned that incorporating ESG practices required focusing on criteria that directly affected their well-being,

health, and comfort. These criteria were closely aligned with green building rating tools, such as the Green Building Index (GBI) and GreenRE in Malaysia, where it evaluate the environmental design and performance of buildings (Gibberd, 2024). These tools incorporate various sustainability categories, including energy and water efficiency, IEQ, and sustainable site planning, which are all relevant to ESG reporting and assessment (Soflaei and Vakilinezhad, 2025). The key elements of green rating tools, such as efficient lighting and heating systems, helped reduce energy consumption, lower operational costs, and reduced a building's overall environmental impact, as highlighted by Sapuan *et al*. (2022).

Green rating systems like LEED and GBI have proven crucial in guiding the adoption of ESG practices (Pang, 2024). These tools not only optimise energy and water use but also promote the use of sustainable materials and practices throughout the building's lifecycle (Wen *et al*., 2020). Meanwhile, the certification systems such as GBI and LEED enhanced tenants' confidence in the building's environmental performance, aligning with their sustainability values and boosting the property's attractiveness (Azli *et al*., 2024). In addition, tenants who are aware of the degree of sustainability standards that the owners of these facilities are aiming for, they can make early and informed lease selections (Li, Lai and How, 2024). As these features become more desirable, building owners are increasingly motivated to implement ESG practices, realising both environmental and financial gains.

2.5.1.8 Encourage Public Transport Usage

To incorporate public transport within ESG practices from the building occupants' perspective, the focus had to be on encouraging the use of sustainable transportation methods that reduced the overall carbon footprint and environmental impact. Ifediora and Igwenagu (2024) highlighted that public transport was a key criterion for achieving environmental sustainability in urban areas. Building occupants could significantly reduce their carbon emissions by opting for public transport instead of private vehicles, thus minimizing the environmental impact associated with building operations (Lu and Lai, 2020). Furthermore, the adoption of electric buses and trains contributed to improved air quality by reducing air pollution through cleaner energy sources, such as

electricity, as opposed to fossil fuels (Leichter *et al*., 2021; Chen, 2024). This transition lowered emissions of harmful pollutants, such as particulate matter and nitrogen oxides, thereby fostering healthier living conditions for building occupants.

Despite the growing adoption of public transportation, many people continued to rely on private cars for commuting (Sukereman *et al*., 2024). Wan, Lu and Sun (2023) argued that Transit-Oriented Development (ToD) helped mitigate this by encouraging individuals to utilise public transport. ToD promoted sustainable urban planning by creating compact, walkable communities around public transport hubs, reducing the need for extensive road infrastructure and parking spaces (Yap, Chua and Skitmore, 2021). This strategy not only enhanced accessibility but also contributed to a more sustainable urban ecosystem by reducing dependency on private vehicles and conserving land resources (Rosli, Samat and Bakar, 2023). In addition, public transport access could significantly increase property values, potentially by 0.1% to 39% (Suhaimi, Maimun and Fazira, 2021).

2.5.1.9 Adopt Green Lease

Green leases provided a framework that ensured tenants and owners aligned their efforts to achieve sustainability goals, promote energy efficiency, and reduce carbon emissions (Wong and Chan, 2024). These leases is structured agreements that outlined the roles and responsibilities of both parties concerning sustainability targets (Anastasiadou *et al*., 2023). Additionally, green leases typically address criteria such as energy-efficient systems, water conservation, waste reduction, and the use of renewable energy sources, all of which contribute to reducing the environmental impact of buildings (Yang, Guevara-Ramirez and Bisson, 2020). By including these criteria, green leases not only led to cost savings through reduce energy bills and operational costs but also improved the environmental quality within the building, benefiting occupant health and well-being.

Wong and Chan (2024) emphasized that green leases enabled tenants and owners to negotiate terms that set clear environmental targets and responsibilities, ensuring both parties contributed to sustainability. The integration of ESG criteria through green leases included commitments to using

energy-efficient appliances, renewable energy sources, and water-saving technologies (Erin, 2023; Yang, Guevara-Ramirez and Bisson, 2020). Additionally, the criteria involved ensuring sustainable materials for building fit-outs and enhancing waste management practices. Li, Lai and How (2024) and Huszar (2023) highlighted that green leases set expectations for both tenants and owners to achieve sustainability, creating an environment where energy consumption, waste production, and resource management were continuously optimized for long-term benefits. In addition, Shibani *et al.* (2021) further supplemented that green rating tools are directly tied to their ownership and operational responsibilities.

2.5.2 Social Criteria

The social criteria in real estate focus on how a development affects people and communities. This includes making buildings more affordable, accessible, and inclusive while also ensuring health, safety, and community involvement. It also covers the well-being of both occupants and the surrounding area. As part of ESG, these factors help create spaces that are not only sustainable but also beneficial for society.

2.5.2.1 Health and Well Being

Manna and Al-Ghamdi (2021) highlighted that occupants spend approximately 90% of their time indoors, which highlighted the significance of promoting buildings based on health benefits. The optimisation of occupant health should therefore be considered a fundamental aspect in the design and planning of buildings. In this regard, Olteanu and Ionascu (2023) stated that health and well-being are essential criteria within ESG practices. These practices positively impact occupant health by improving the quality of the indoor environment, encompassing factors such as thermal comfort, natural lighting, indoor air quality, ventilation, safety, and the reduction of pollutants. When ESG practices are effectively implemented, they foster a healthier and more comfortable living environment, while also boosting occupant satisfaction and overall well-being (Grewal *et al*., 2024; Oswald, Moore and Baker, 2020).

2.5.2.2 Indoor Air Quality

It was essential to prioritise design, operational, and maintenance strategies that minimised air pollutants while maximising fresh air intake in order to incorporate IAQ as part of ESG practices. Riratanaphong and Pewklieng (2025) emphasised that effective IAQ management relied on optimising ventilation systems, controlling pollutant sources, and implementing continuous monitoring. From a design standpoint, incorporating natural ventilation by maximising cross-ventilation through window placements, operable skylights, and atriums reduced reliance on mechanical systems, thereby improving air circulation (Sadrizadeh *et al.,* 2022). Additionally, selecting low-emitting materials such as paints, adhesives, and furniture minimised indoor air pollution, contributing to healthier spaces (Wang and Xue, 2023).

From an operational and maintenance perspective, establishing a robust IAQ management plan was crucial. In light of this, regular maintenance of HVAC systems, ventilation ducts, and exhaust fans, along with source control measures, helped control pollutants and maintain a steady supply of clean air (Elsaid and Ahmed, 2021). Asim *et al.* (2022) explored that energy-efficient HVAC units with proper air filters not only captured particulate contaminants but also ensured consistent air quality, reducing the likelihood of Sick Building Syndrome (SBS). Moreover, integrating occupant education on how to maintain IAQ and encouraging their participation in monitoring programs fostered a proactive approach to maintaining healthy indoor environments. Overall, these criteria not only improved occupant well-being but also contributed to a more sustainable, ESG-compliant built environment.

2.5.2.3 Natural Lighting

Access natural lighting into building design has become a critical ESG criterion, benefiting both environmental sustainability and occupant well-being (Kempeneer and Compernolle, 2021). Several criteria must be met to maximise natural light within buildings. For instance, ensuring sufficient natural light penetration through strategically placed windows, skylights, and clerestory windows was essential (Voronkova and Podlasek, 2024). These elements helped reduce the need for artificial lighting, thereby lowering energy consumption and promoting sustainability (Mahdavinejad *et al*., 2024). Additionally, optimising

window placement, considering building orientation, and utilising light shelves and reflectors were important criteria for maximising daylighting potential while minimising heat gain (Trehan, 2024).

Moreover, to prevent negative impacts like glare and heat gain, ESG practices incorporated control measures such as adjustable blinds, shades, and daylighting control systems (Rane, Choudhary and Rane, 2023). These criteria not only contributed to energy efficiency but also improved the quality of the indoor environment by reducing the need for artificial lighting and controlling thermal comfort (Mahdavinejad *et al*., 2024). Passive solar design features were also incorporated as part of the criteria to utilise sunlight for heating and cooling. Knoop *et al.* (2020); Papinutto *et al*. (2022); Moghayedi, Hubner and Michell, (2023) highlighted that maximizing natural daylight helped reduce energy costs and increase productivity. Furthermore, exposure to natural light improved mental health, with Woo *et al*. (2021) and Bravo and Hernandez (2022) finding that natural lighting reduced eyestrain and feelings of depression, aligning with ESG goals for healthier living environments.

2.5.2.4 Thermal Comfort

Thermal comfort has been identified as the most critical factor in promoting the health and well-being of occupants (Majewski *et al*., 2020). This includes the implementation of passive design strategies, such as maximizing natural light, enhancing ventilation, and incorporating shading, which collectively reduce dependence on mechanical heating and cooling systems (Bera *et al*., 2024). Furthermore, zoning systems allowed occupants to adjust temperature settings in different areas based on individual preferences, which is an important criterion for enhancing comfort (Solano *et al*., 2021). Additionally, high thermal mass materials, such as concrete or stone, are essential as they absorbed and stored heat, contributing to the stabilisation of indoor temperatures and improving energy efficiency for occupants.

Another critical criterion involved the use of energy-efficient HVAC systems that maintained optimal thermal comfort while minimising energy consumption (Obushnyi and Novikov, 2024). Further, the effective thermal insulation in walls, floors, and ceilings also played a key role by reducing heat transfer and maintaining a consistent indoor temperature, which benefited both

energy efficiency and occupant comfort (Gonzalez, 2024). Moreover, occupant behavior significantly influenced thermal comfort, where actions such as adjusting fan speed or controlling windows and doors are found to enhance comfort levels (Bhandari *et al*., 2023). By implementing these criteria, buildings are able to achieve a sustainable, comfortable, and energy-efficient indoor environment that aligned with ESG goals.

2.5.2.5 Noise Control

According to Pimentel (2023), noise control is a key criterion for incorporating ESG practices, as it directly affects occupant well-being and productivity. To effectively incorporate noise control as part of ESG practices, several criteria should be implemented. These include the use of sound-absorbing materials in walls, ceilings, and floors to minimise noise transmission and reverberation (Chintapalli, 2024). Additionally, measures such as soundproofing HVAC systems, plumbing, and isolating external noise sources from the building's interior should be implemented (Andargie, 2022). Meanwhile, green design features, like green walls and natural spaces, can further enhance the indoor environment by absorbing sound (Yan *et al*., 2022). Moreover, incorporating exterior noise barriers, such as landscaping and walls, helps reduce external noise, such as from traffic (Ahac, Ahac and Lakusic, 2021).

From an operational perspective, selecting energy-efficient, quiet HVAC systems and other equipment, alongside ensuring proper maintenance, can reduce noise from these systems (Olatunde, Okwandu and Akande, 2024). A comprehensive noise reduction program, which includes occupant education and feedback mechanisms, is also crucial (Orikpete *et al*., 2024). To clarify further, the social and governance aspects of noise control can involve gathering regular feedback from occupants regarding noise levels and their impact on well-being and ensuring that noise control measures are accessible to all, including those with hearing sensitivities. Overall, these noise control criteria contribute significantly to improving occupant health, productivity, and the overall quality of life, aligning with ESG principles and enhancing the sustainability of the built environment.

2.5.2.6 Safety and Security

Creating a sense of security and ensuring peace of mind for occupants has become a crucial criterion for incorporating ESG practices in high-rise residential properties (Sellathurai, 2020; Wang, Huang and Yao, 2023; Vrancic, Zadravec and Orehovacki, 2024). As a result, ensuring tenant security becomes a critical aspect of ESG criteria (Olteanu and Ionascu, 2023; Wang and Xue, 2024). For occupants, a sense of safety is not only a basic necessity but also a key factor influencing their quality of life, mental well-being, and overall satisfaction with the property (Wang and Wang, 2023; Blunden, 2023; Bate, 2020). Tenants are more likely to remain in buildings that prioritide their security, as these measures create a safer and more comfortable living or working environment (Holding *et al*., 2020; Ashur and Aishah, 2024).

Riratanaphong and Pewklieng (2025) explored several key security criteria, including the implementation of access control systems, CCTV surveillance, and the presence of trained security personnel, all of which reduce the risk of crime and enhance occupants' sense of security. Moreover, fire safety systems, such as smoke detectors, sprinklers, and clearly marked evacuation routes, are essential criteria for ensuring occupant protection in case of emergencies (Kodur, Kumar and Rafi, 2020). Additionally, buildings that prioritise safety contribute to fostering a sense of community, as occupants feel confident that their well-being is actively safeguarded (Dong *et al*., 2023). Thanaraju *et al.* (2019) further emphasised that tenants are willing to pay a premium for buildings that meet these safety criteria. Thus, ensuring safety and security is a fundamental criterion in ESG practices, reflecting how well a building can support occupant needs and create a positive and sustainable living environment (Nor, Aziz and Zyed, 2020; Thanaraju *et al*.,2019).

2.5.2.7 Community Engagement

Community engagement refers to the interaction and collaboration with surrounding communities (Barker *et al*., 2020). These issues are frequently attributed to the architectural design of such buildings, which limits opportunities for resident interaction, thereby weakening the sense of community (Argentzell *et al*., 2022). Consequently, the criteria for achieving this included focus on creating diverse and inclusive engagement activities,

providing accessible channels for communication, and ensuring that feedback is genuinely listened to and acted upon (Anthony, 2024; Jack, Ridley and Turner, 2019). Meanwhile, community engagement can be prioritised through the organization of events, workshops, and forums that encouraged social interaction, reinforcing a sense of belonging and shared purpose among occupants (Iwuanyanwu *et al*., 2024; Vries, 2025; Nurfadlilawati and Kusuma (2024).

Other than that, Olteanu and Ionascu (2023) emphasised that community engagement is a crucial component of the ESG framework, ensuring that building projects and operations address the needs and aspirations of the surrounding community. This fosters a positive relationship between the building and its environment. This engagement often includes the development of shared spaces, such as meditation rooms, relaxation areas, and mindfulness spaces (Ndimako, Babalola and Ugah, 2024). By promoting social connectivity, it can reduce the loneliness and social isolation by reinforcing a greater sense of belonging to community (Suragarn, *et al*., 2021). Adabanya *et al*. (2023) further found that occupants who engage in community activities, such as recycling programs, help foster a safer and more cohesive community. Therefore, a strong sense of community is often reflected in the level of social connection among residents (Eng, 2021).

2.5.2.8 Social Inclusion

Individuals with disabilities often faced significant barriers that limited their full participation in society. ESG criteria emphasised the importance of inclusive design to address these challenges and promote equal opportunities (Semet, 2020). Bozic (2023) identified that integrating accessibility features such as tactile paving, ramps, elevators, wide doorways, and accessible parking was essential to ensure that people with mobility, visual, or hearing impairments could navigate urban environments with ease. These design elements, as part of ESG criteria, fostered social inclusion, enabling all individuals to access services, information, and spaces on equal terms.

In addition to physical design, the integration of smart technologies became an important ESG criterion. Automated systems, including lighting, HVAC, and security controls, provided further accessibility benefits for

building occupants with disabilities. According to Bozic (2023), these systems, typically managed through apps or web portals, allowed individuals with disabilities to independently control their living environment. Moreover, visual aids such as pictograms and color coding were also essential, improving navigation for individuals with cognitive impairments and enhancing both daily activities and emergency responses (Kamran, 2021). Furthermore, addressing barriers in public transport was a key part of ESG, particularly in rural and suburban areas. Berg and Ihlstrom (2019) highlighted that inadequate public transport contributed to social exclusion. Consequently, ESG practices encouraged accessible public transport, which ensured equitable access to services such as employment, education, and healthcare, promoting a more connected community (Ifediora and Lgwenagu, 2024). This not only enhanced affordability and quality of life for building occupants but also reduced social disparities, aligning with the broader social objectives of ESG.

2.5.2.9 Construct Affordable Housing

Housing affordability as a key criterion in social sustainability (Haidar and Bahammam, 2021). In Malaysia, the imbalance between housing demand and supply, particularly in urban areas, has led to significant social inequalities (Saleh *et al*., 2024). To address this, ESG practices incorporate criteria that promote affordable housing for lower and middle-income groups (Zulkifli and Ismail, 2023). These criteria included energy-efficient designs, which reduced utility costs for occupants, and water conservation methods that minimised environmental impact while lowering operational expenses (Obushnyi and Novikov, 2024; Subramaniam *et al.,* 2024; Aini, Aziz and Zulkifili, 2017).

Additionally, the integration of Transit-Oriented Development (ToD) became another key criterion, enhancing housing affordability by reducing transportation costs (Zhao, 2023). ESG practices also emphasized long-term financial benefits by implementing features like green roofs and water-efficient plumbing, which decreased maintenance costs by reducing the frequency of repairs. Furthermore, Iamtrakul *et al.* (2024) and Ahmed and Salam (2022) mentioned that ensuring access to essential services, such as transportation, healthcare, and education further improved the quality of life for occupants. Inclusivity was also emphasised, with buildings being designed to accommodate

individuals of all ages, abilities, and backgrounds (Nasir *et al*., 2024). By focusing on these criteria, affordable housing developments not only provided affordable shelter but also contributed to a sustainable, inclusive environment that benefited both the occupants and the surrounding community.

2.5.3 Governance Criteria

Governance criteria in ESG focus on how buildings are managed to ensure fairness, transparency, and accountability for occupants. This includes clear tenant rights, ethical property management, and following safety and sustainability rules. It also covers fair leasing terms, proper maintenance, and good communication between owners and tenants. In addition, good governance helps create a safe, well-managed, and fair environment for everyone in the building.

2.5.3.1 Transparency

Transparency was a key criterion within the governance component of ESG, particularly from the perspective of building occupants. It involved the systematic disclosure of relevant operational and financial data, enabling tenants, investors, and regulatory bodies to make informed decisions. In Malaysia, 55% of respondents acknowledged the accessibility of energy efficiency data, such as energy performance certifications (Pang, 2024). However, a lack of transparency often arose when property owners withheld financial data, hindering tenants' ability to evaluate the environmental and financial performance of the building (Olapade and Olaleye, 2019). This lack of transparency limited tenants' ability to assess the property’s adherence to ESG standards, affecting their trust in property management.

ESG criteria emphasised the need for clear and accessible information regarding building performance. Building owners are expected to provide transparency in areas such as energy consumption, environmental impacts, and operational costs. The adoption of frameworks like the Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) ensured that ESG practices are upheld through transparent reporting (Zenkina, 2023). For instance, GRI allowed building owners to disclose their impacts on key sustainability issues, such as energy consumption and human rights, which

had a direct influence on tenant experiences (Bivi, 2022). Furthermore, as Castro and Gradillas (2022) mentioned, transparency in ESG metrics enabled tenants to understand a building's environmental and social impacts, thus building trust and fostering a positive relationship with tenants and the broader community (Mantyla, 2025; Voland, Saad and Eicker, 2022).

2.5.3.2 Risk Management

Risk management refers to the building occupants proactive to recognise and deal with the risks. Yebenes (2024); Meng and Shaikh (2023) explained that risk management is a key component of ESG criteria. Wang and Xue (2023) found that ESG compliance with regulations concerning waste management, water management, air quality and other environmentally sensitive factors that often impact real estate operations or decisions. This compliance helps building occupants mitigate the risk of penalties or fines associated with environmental regulations (Sukeri and Sani, 2024; Ghafoor *et al,* 2025). Chen, Song and Gao (2023) asserted that buildings with strong ESG practices are less likely to encounter legal issues because of their proactive efforts to minimize environmental damage. Besides that, ESG practices enhance the transparency in the financial performance (Fu and Li, 2023), thereby reducing the reputation risk such as negative publicity from ESG issue and a lack of transparency. Furthermore, implementing ESG practices can effectively reduce operational risks by decreasing utility expenses for building occupants (Li *et al*., 2025). Hence, the ESG practices has a emphasise the health and well-being of occupiers, thereby it lower the risk of respitorty issues.

2.5.3.3 Stakeholder Engagement

Shapsugova (2023) mentioned that stakeholder engagement was a key criterion for incorporating ESG practices. This criterion involved establishing clear communication channels, ensuring active participation, and fostering collaboration with stakeholders, including tenants, local communities, investors, and regulatory bodies. ESG practices emphasised the need for transparency and mutual accountability, ensuring that stakeholders were kept informed about the building's environmental, social, and governance impacts (Waykar and Yambal, 2025). Hewa, Pan and Kumaraswamy (2023) highlighted that stakeholder

engagement was essential for aligning the interests of building owners, tenants, and the surrounding community.

The key criteria for effective stakeholder engagement included developing open communication channels and involving stakeholders in decision-making processes (Troise and Camilleri, 2021). This required gathering feedback from building occupants regarding their needs and concerns, particularly concerning sustainability initiatives and the built environment (Liu *et al.,* 2024). Furthermore, ESG practices focused on fostering long-term relationships with stakeholders through continuous dialogue and transparency, ensuring their concerns were addressed throughout the building's lifecycle. A robust stakeholder engagement strategy not only improved the building's social sustainability but also enhanced its overall ESG performance (Padilla-Rivera *et al*., 2025).

2.5.3.4 Ethical Conduct

Ethical conduct was a significant criterion for incorporating ESG practices from the perspective of building occupants (Riratanaphong and Pewklieng, 2025). This criterion emphasised transparency, fairness, and integrity in all building operations and interactions with stakeholders (Salazar, 2024). ESG practices highlighted the importance of adhering to ethical standards, ensuring that building management and tenants acted responsibly in their dealings with one another and the broader community (Hopkins, 2023). According to Smith et al. (2023); Bressane, Loureiro and Almendra (2024), ethical conduct included ensuring that building occupants were treated equitably and fairly, with clear communication regarding policies and decisions.

The implementation of ethical conduct within ESG criteria also included mechanisms for addressing grievances, promoting fairness in decision-making, and ensuring compliance with legal and moral obligations (Torres *et al.*, 2023). In this regard, ESG practices required that all transactions, such as leasing and procurement, were conducted with integrity, prioritizing fairness and the long-term well-being of the community. By focusing on these criteria, buildings were able to foster a positive, respectful, and ethically responsible environment that contributed to the overall success of ESG initiatives (Williams, 2024). Hyatt and Gruenglas (2023) further stated the ethical conduct ensures

that building owners make fair and unbiased decisions. By implementing robust anti-discrimination policies, buildings can also ensure that all occupants are treated fairly and with respect, free from any form of prejudice or discrimination (Diana, 2024).

2.5.3.5 Accountability

Olteanu and Ionascu (2023) stated that accountability involved ensuring transparency, clear responsibility, and ethical behavior in building management and occupant interactions. Smith *et al*. (2022) revealed that accountability required building owners to provide accurate and timely information regarding the building's operations, energy performance, and any potential environmental or social impacts. This criterion emphasised the importance of having clear systems in place for tracking and reporting ESG-related activities, ensuring that both tenants and management adhered to the standards set forth (Zhao, 2023).

Moreover, the integration of accountability within ESG practices also included mechanisms for holding all stakeholders responsible for their actions (Alhoussari, 2024). This involved the establishment of regular performance assessments, feedback channels for building occupants, and formal grievance mechanisms to address any concerns raised by tenants (Mubiru and Naturinda, 2023). Furthermore, accountability was crucial in fostering trust between building owners and occupants, which helped ensure compliance with sustainability goals and promoted a culture of responsibility. As mentioned by Zahari *et al.* (2024), when accountability was embedded in the building's governance framework, it reinforced the commitment to ethical practices, contributing to the overall success of ESG initiatives.

2.5.3.6 Corporate Social Responsibility (CSR) Reporting

CSR reporting provided a transparent means for building owners to disclose their social, environmental, and governance activities, offering insights into how they aligned with sustainability and ethical standards. Fatourehchi and Zarghami (2020) supplemented that CSR reporting was essential for ensuring accountability, as it allowed occupants and stakeholders to assess the building's performance in terms of its environmental and social impacts. This transparency not only fostered trust between the building's management and its occupants but

also demonstrated a commitment to sustainable development and ethical business practices (Aldalaty and Piranej, 2024).

Moreover, CSR reporting included the documentation of energy consumption, waste reduction efforts, and community engagement activities, ensuring that building owners addressed both environmental and social concerns (Emeka-Okoli *et al*., 2024). By integrating detailed CSR metrics into ESG practices, building owners were able to highlight their achievements in reducing carbon footprints, promoting local businesses, and enhancing tenant well-being. As advocated by Yin (2023), incorporating CSR criteria in ESG practices ensured that building occupants had access to accurate, timely information, which empowered them to make informed decisions regarding their environmental and social engagement. This also promoted a culture of shared responsibility, where both building owners and occupants worked collaboratively to achieve ESG goals.

2.6 Summary of Findings from Literature Review

In a nutshell, this research aims to explore the implementation of ESG practices from the perspective of building occupants in Malaysia. To achieve this, a thorough literature review was conducted on the significance of incorporating ESG practices and the criteria for their implementation, as shown in Figure 2.5. Besides, ESG is categorised into three pillars which are environmental, social, and governance. A total of 18 key reasons for adopting ESG practices were identified and explained based on previous studies. In addition, 23 criteria were outlined under these pillars. Furthermore, demographic factors such as gender, age, ethnicity, education level, location, and income level were found to influence ESG practices.

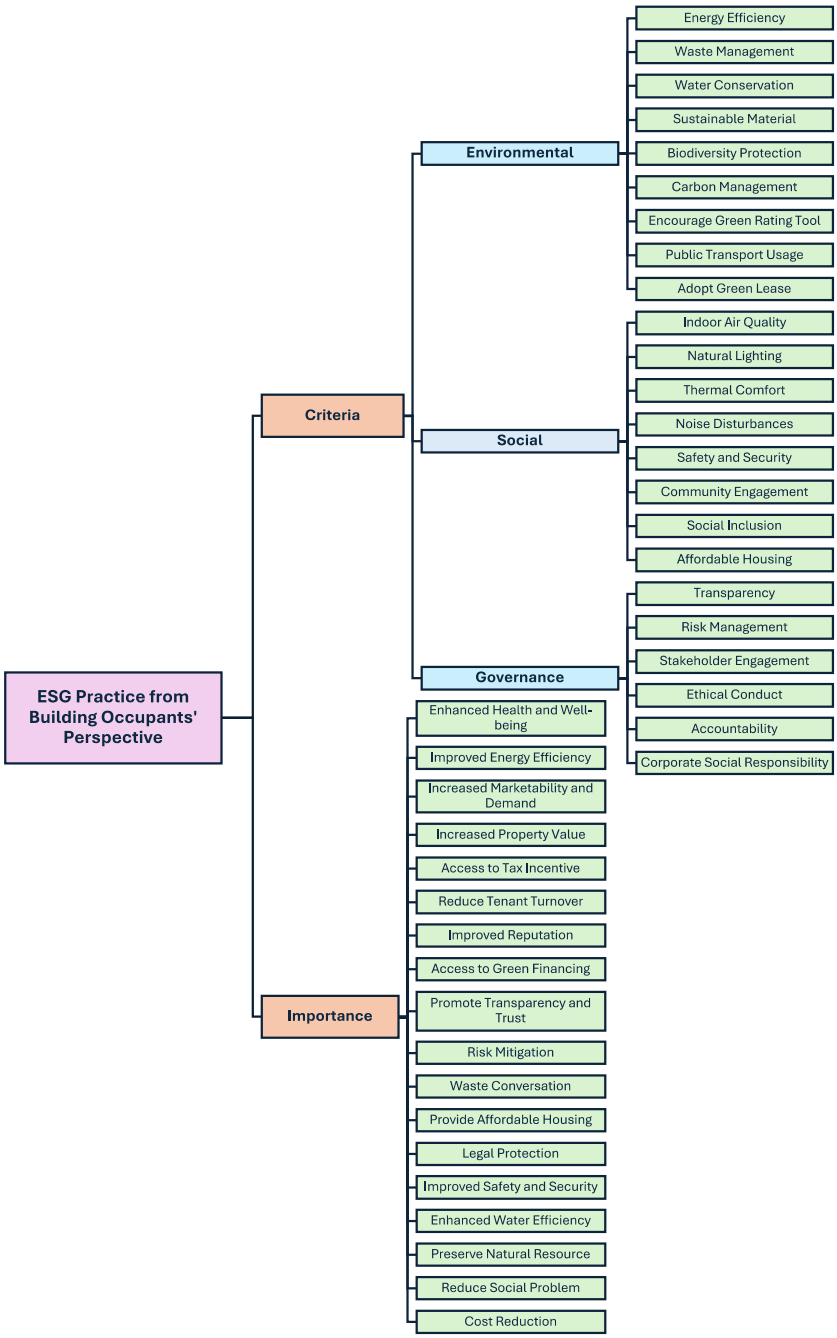

Figure 2.1: Summary of Literature Review.

2.7 Summary of Chapter

In conclusion, the definition and concept were presented in this chapter. The importance of incorporating ESG practice and ESG practice from building occupants' perspective were summarised in Figure 2.1. Meanwhile, the ESG criteria were also divided into three categories which are environment, social, and governance.

CHAPTER 3

METHODOLOGY AND WORK PLAN

3.1 Introduction

This chapter discusses the selection of the research methodology for this study. In addition, it explained the research method and the process of conducting the literature review. This chapter also outlined the sampling method, data collection methods, questionnaire survey design, and the method used for data analysis.

3.2 Research Methods

The term 'research' is defined as a systematic process of gathering and analysing information to understand of the phenomenon under study (Saunders, Lewis and Thornhill, 2015). Creswell and Creswell (2017) further explained that research method is a techniques that used to conduct of research. Besides, research methods are typically classified into three categories which are qualitative, quantitative, and mixed methods. The selection of an approach depends on the nature of the study, as each has unique characteristics, strengths, and limitations that contribute to achieving specific research objectives.

3.2.1 Quantitative Research Approach

Secolsky and Denison (2017) defined quantitative research as a methodology for evaluating objective theories by exploring the relationships between variables. These variables are measured using tools to generate numerical data, which is subsequently analysed with statistical methods. In this method, research is to starts with a theory, followed by data collection to accept or reject the theory, and then proceeds with revisions or additional testing to refine the theory (Creswell and Creswell, 2018).

Neuman (2014) described quantitative research as the collection and analysis of numerical data, which ensuring objective and unbiased results (Creswell, 2015). Besides, Creswell and Creswell (2018) found that quantitative method utilised a larger sample sizes. As a result, it allows for more accurate

predictions and ensures that findings are representative of the population as a whole. In addition, quantitative reseach method allowed researchers to test hypotheses and established causal relationships between variables (Neuman, 2014), making it particularly useful for predictive analysis and analytical purposes.

In contrast, a key limitation of quantitative research is its lack of depth and context, as it primarily focuses on numerical data, which restricting a comprehensive understanding of complex issues (Neuman, 2014). In addition, the validity of research findings is influenced by sample size, as smaller samples may reduce accuracy, while larger sample sizes can be time-consuming. Furthermore, quantitative research tend to be inflexible, as the research design is typically structured and pre-determined (Creswell, 2015). This making it difficult to adjust if unforeseen issues arise during the research process, thereby limit the ability to gather specific feedback or conduct thorough follow-up on the findings.

3.2.2 Qualitative Research Approach

The qualitative research method is used to gain in-depth insight into the meanings that individuals or groups attribute to social or human issues (Creswell, 2014). This approach emphasizes collecting, analyzing, and interpreting data through detailed observation of people's behaviors, interactions, and communications (Rajput, 2023). Creswell (2015) further stated that qualitative research is particularly effective at providing detailed insights into the values, opinions, behaviors, and social settings of specific groups. Hence, it analysing texts and images rather than number and statistic.

One of the advantage of qualitative research is provide an in-depth understanding. This is because the collection methods of qualitative data including interviews with open-ended question and observations described in words (Sekaran and Bougie, 2016). Consequently, it allows researchers to have in-depth interactions with participants to understand their viewpoints and experiences in detail. Moreover, qualitative research has a flexible structure due to the use of open-ended questions (Creswell and Creswell, 2018). In other words, researchers can express their findings more flexibly in qualitative

research because they are not restricted by fixed questions or specific measurement tools.

However, qualitative research is subjective, as it relies on personal experiences, perceptions, and behaviours (Creswell, 2002). As a result, it can lead to researcher bias, potentially affecting the validity and reliability of findings. Furthermore, the findings depend on the setting, participants, and researcher interpretations, making it challenging to generalise results to broader populations or contexts. Additionally, qualitative methods are typically more time-consuming than quantitative approaches due to the need for extended participant interactions and detailed data analysis.

3.3 Justification of Selection

The quantitative research method was utilised to evaluate the research objectives in this study. The primary purpose of this research is to investigate the ESG practices from building occupants' perspective in Malaysia. Therefore, it is essential to gather information from a broad range of participants in order to obtain precise results.

The questionnaire was chosen as the preferred method within quantitative research strategies to obtain a large number of responses. This choice is driven by the fact that quantitative research often involves large, randomly selected samples (Creswell, 2015). Besides sampling, this approach relies on numerical data and statistical analysis, which offers objective and measurable results that can be generalised to a broader population. Furthermore, the structured and standardised nature of quantitative research minimises the influence of the researcher's personal biases on both data collection and analysis. Moreover, quantitative methods often involve the use of statistical software like SPSS to streamline the data analysis process. This software allows researchers to efficiently test hypotheses, identify patterns, and quantify relationships between variables. As a result, data analysis with quantitative methods tends to be less time-consuming compared to qualitative methods.

In contrast, the qualitative approach is less suitable for this study as it primarily focuses on interpreting data based on participants' personal views, feelings, and experiences (Creswell, 2002). This can lead to selective attention,

selective interpretation, and confirmation bias, where the researcher tends to focus on or emphasise information that aligns with their existing beliefs and assumptions. Further, interviewing a large number of participants is much more time-consuming than distributing questionnaires. The process of completing interviews is definitely longer than filling out a questionnaire. As a result, the data collected from individual interviews may not adequately represent the broader community of building occupants. Therefore, the quantitative method was selected, as it provides results that can better reflect the perspective of all building occupants in Klang Valley.

3.4 Literature Review

A literature review examines scholarly articles, books, and other relevant sources related to a specific topic or research area, thereby providing a summary, description, and critical evaluation of these works (Yadav, 2023). This process helps identify research gaps and areas where further research is needed. In this study, the steps suggested by Creswell and Guetterman (2019) for conducting a systematic literature review were followed.

The process begins with identifying key terms relevant to the study. In this research, the primary keywords were "ESG practices", "building occupants", "sustainability", and others. The next step involves searching for relevant literature from various sources and databases. In this study, sources were gathered from journals and articles available through ScienceDirect, Elsevier, Google Scholar, as well as reference books on Google Books. The emphasis was placed on primary sources, such as journal articles, books, conference papers, while secondary sources were used less frequently to provide a broad overview of the study. The third step involves evaluating and identifying the literature most relevant to the study's topic. This was followed by organising the literature by summarising key points and taking detailed notes. A literature map, as shown in Figure 2.1, was created to visually represent the findings from the reviewed literature. The final step is writing the literature review, which involves synthesising the insights and findings from the literature to provide a comprehensive overview of the research topic.

3.5 Quantitative Data Collection

This study adopted a quantitative approach for data collection, as a large sample was needed to ensure statistically reliable results that could be generalised to a broader population (Newhart and Patten, 2023). The data collected was primary data, which obtained through the distribution of questionnaires. The questionnaire was chosen as it is widely used, familiar to respondents, and an effective tool for gathering data from large populations (Sekaran and Bougie, 2016).

3.5.1 Questionnaire Design

In this research, the first page of the questionnaire served as a cover page. It included the researcher's personal information, a brief introduction to the questionnaire, and a short explanation of the ESG practices. Furthermore, the questionnaire was organized into four main sections. Section A was designed to gather respondents' demographic information, including age group, gender, income range, education level, marital status, and other relevant details. The questions were presented using a combination of closed-ended and semi-open-ended formats with predefined response options.

Besides, Section B included a total of eighteen (18) listed importance of incorporating ESG practices in high-rise residential properties and the respondents were requested to rate them based on their perspectives. In Section C, it focused on the ESG criteria in their high-rise residential properties. There was a total of twenty-three (23) questions, which were designed based on three criteria (environmental, social, and governance). Both sections were developed using a five-point Likert scale to measure the degree of importance, with responses ranging from 1 = not important, 2 = less important, 3 = moderately important, 4 = very important, to 5 = extremely important. In Section D, respondents were requested to rate the adoption level of ESG practices in their residential properties. The rating scale ranged from 1 (Never Adopt) to 5 (Always Adopt). Table 3.1 summarises the questionnaire design, and a copy of questionnaire survey is provided in the Appendix.

Table 3.1: Questionnaire Design.

Section	Type of Question	Number of Question	Scale	Purpose of Question
A	Closed-ended and semi-open ended question	18	Nominal	To obtain the respondents' demographic information
B	5-point Likert scale of importance level	18	Ordinal	To achieve the objective 1 of the study
C	5-point Likert scale of importance level	23	Ordinal	To achieve the objective 2 of the study
D	5-point Likert scale of adoption level	23	Ordinal	To achieve the objective 3 of the study

3.5.2 Sampling Determination

Collecting data from an entire population is often unfeasible due to limitations in time and resources. Therefore, sampling is essential to identify a subset of individuals that can effectively represent the whole population. Yakkaldevi (2022) defined sampling is the process of selecting a subset of individuals from a larger group to estimate characteristics of the entire population. The processes include defining a population, selecting a sampling method, and calculating sample size (Creswell, 2012). This research targerted individuals residing in Klang Valley who live in high-rise properties with a building height of more than 17 storeys.

While sampling technique can be generally divided into two categories, mainly probability sampling and non-probability sampling. In this study, convenience sampling from non-probability sampling was initially employed by distributing questionnaire surveys to family, friends, and residents in Klang Valley. Subsequently, purposive sampling was applied to refine the data by excluding respondents who selected medium-rise, low-rise, and landed

properties. The participants were selected based on the research objective, specifically targeting individuals residing in high-rise properties with a building height of more than 17 storeys.

Given the broad scope of this study, collecting data from all high-rise residents in Klang Valley was not feasible. Therefore, the Cochran formula was applied to determine an appropriate sample size that would allow for reliable generalizations about the population. The formula is expressed as follows (Cochran, 1977):

$$n = \frac{Z^2 pq}{e^2} \tag{3.1}$$

Where,

n = sample size

z = the z-scores of the desired confidence level

p = the proportion of the population with attributes understudy

q = 1- p

e = the margin of error

$$n = \frac{1.96^2(0.5)(1-0.5)}{0.05^2} = 384$$

In this study, a 95% confidence level was adopted, corresponding to a Z-score of 1.96. The margin of error was set at 5% to ensure a balance between accuracy and feasibility in data collection. Given the absence of a prior estimate for the population proportion, p = 0.5 was assumed, as it provides the largest possible sample size, ensuring a more precise and reliable confidence interval. Using the Cochran formula, a minimum sample size of 384 respondents was determined to be appropriate for achieving a reasonable level of accuracy in representing the population.

However, given practical constraints, a smaller sample size was considered. Consequently, the Central Limit Theorem (CLT) was applied to determine an appropriate sample size. The CLT is defined by Middleton (2021) as a principle stating that as the sample size increases, the distribution of the sample will approximate a normal distribution, regardless of the population's original shape. In addition, Sternstein (2023) stated that a sample size of 30 or more is generally considered sufficient to represent an approximately normal

distribution. Thus, this study adopted a sample size of thirty (30) for each group under investigation regarding ESG practices implementation in Klang Valley high-rise properties.

3.5.3 Questionnaire Distribution

An electronic questionnaire was created using Google Forms and distributed through online methods in this study. The online distribution was carried out by sharing the Google Form link on various social media platforms, including Facebook, Instagram, WhatsApp, WeChat, and Messenger. This approach allowed for efficient and convenient data collection from respondents. The distribution and collection of surveys from targeted respondents took approximately five (5) weeks.

3.6 Data Analysis

Data analysis involves transforming raw data into meaningful information through the systematic use of statistical methods (Mathew, 2020). Therefore, the Statistical Package for the Social Sciences (SPSS) was employed to analyze all quantitative data. Specifically, five statistical tests were selected to examine the collected data, including Cronbach's Alpha Reliability Test, Arithmetic Mean, Mann-Whitney U Test, Kruskal-Wallis Test, and Spearman's Correlation Test.

3.6.1 Cronbach's Alpha Reliability Test

The Cronbach's Alpha Reliability Test is used to evaluate the internal consistency of a scale comprising Likert-scale questions. The coefficient ranges from 0 to 1, with higher values indicating greater reliability. A low Cronbach's Alpha value suggests that the items within a questionnaire may not consistently measure the same construct, potentially leading to unreliable data analysis. Generally, scores below 0.60 are considered poor, scores of 0.70 or higher are acceptable, and scores above 0.80 are good (Hansali, Zhang and Maleh, 2024). Determining internal consistency is essential to ensure the validity of a test before it is used in research. Therefore, this method is applied to assess the reliability of Sections B, C, and D in the questionnaire.

3.6.2 Arithmetic Mean Test

The arithmetic mean is one of the most commonly used measures of central tendency, calculated by summing all values in a data set and dividing by the total number of observations (Chatterjee, 2025). In this study, the arithmetic mean was used to analyse respondents' perceptions of the importance, criteria, and adoption of ESG practices. Once the mean score was calculated for each variable, the variables were then ranked from highest to lowest in order to determine how respondents perceived their importance and adoption levels.

3.6.3 Mann-Whitney U Test

The Mann-Whitney U test is a non-parametric statistical test commonly used to compare the distributions of two independent groups on continuous or ordinal variables (Kore *et al.*, 2024). Building occupants from different socio-demographic groups may have varying opinions and concerns regarding ESG practices. Therefore, this test is employed to examine potential differences in ESG practices across these socio-demographic groups.

In this study, the dependent variables are "importance of incorporating ESG practices," "criteria for incorporating ESG practices," and "adoption of ESG practices," while the independent variables are the socio-demographic profiles of occupants, including "education level," "marital status," "housing status," and "geographical area." To evaluate the differences between these independent and dependent variables, the following hypotheses are proposed:

- Null hypothesis (H_0): There is no significant difference across the social demographic of building occupants on the ESG practices.
- Alternative hypothesis (H_1): There is a significant difference across the social demographic of building occupants on the ESG practices.

3.6.4 Kruskal-Wallis H Test

A Kruskal-Wallis test is a non-parametric statistical method used to assess significant differences among more than two independent groups based on an ordinal dependent variable (Gliner and Morgan, 2000). This study applied the Kruskal-Wallis test to analyse variations in ESG practices across different

demographic backgrounds. The independent variables included “income level”, and “age”.

The test will rank all data points from smallest to largest across groups, then calculates the sum of ranks for each group. These rank sums are used to compute a test statistic called H, which is then compared to a chi-squared distribution with degrees of freedom to determine whether there is a significant difference among the group medians. The null hypothesis (H_0) is rejected if the H-value exceeds the critical chi-square value, indicating a significant difference. Conversely, if the H-value is lower than the critical chi-square value, the null hypothesis fails to be rejected. To determine the significant difference between the demographic groups, the null hypothesis (H_0) and alternative hypothesis (H_1) were established.

- Null hypothesis (H_0): There is no significant difference in implementing ESG practices between the different social demographics.
- Alternative hypothesis (H_1): There is significant difference in implementing ESG practices between the different social demographics.

3.6.5 Spearman’s Correlation Test

Spearman's correlation is a nonparametric statistical method used to assess the strength and direction of the relationship between two ordinal or ranked variables. In this study, the relationship between the perceived importance of incorporating ESG practices and the criteria of ESG practices was examined, as well as the relationship between these criteria and the adoption level of ESG practices. The correlation coefficient ranges from -1 to +1, where a coefficient of +1 indicates a perfect positive monotonic relationship, -1 indicates a perfect negative monotonic relationship, and 0 suggests no monotonic relationship (Dehalwar and Sharma, 2023). A positive correlation implies that as one variable increases, the other also tends to increase, indicating that both variables move in the same direction. The correlation strength and its interpretations are summarised in Table 3.2.

Table 3.2: Correlation Strength and Interpretations of Relationship (Dancey and Reidy, 2004).

Correlation Strength	Interpretations
≥0.70	Very strong relationship
0.40-0.69	Strong relationship
0.30-0.39	Moderate relationship
0.20-0.29	Weak relationship
0.01-0.19	No or negligible relationship

3.7 Summary of Chapter

In a nutshell, this study employed a quantitative approach to effectively meet the research objectives. A questionnaire survey was distributed to the target respondents, and the collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) software. To examine data relationships and fulfill the research aims, Cronbach's Alpha reliability test, Mann-Whitney U Test, Arithmetic Mean, Kruskal-Wallis Test, and Spearman's Correlation Test were utilised.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents and discusses the findings from the survey on ESG practices in high-rise residential buildings from the perspective of building occupants. It begins with an overview of the respondents' demographic profiles, followed by an assessment of the data's reliability using Cronbach's Alpha Reliability Test. Subsequently, Arithmetic Means are calculated to evaluate the perceived importance of various ESG practices. To investigate differences in perceptions across demographic groups, the Mann-Whitney U Test and Kruskal-Wallis Test are applied, while Spearman's Correlation Test is employed to examine relationships between key variables.

4.2 Demographic Background of Respondents

A total of 218 responses were gathered from occupants of high-rise residential buildings within the Klang Valley. However, 70 sets of questionnaires fell outside the scope of high-rise buildings and were excluded from the analysis. Consequently, 148 valid responses were used for the analysis. The data collected from the respondents are presented in Table 4.1.

Table 4.1: Summary of Respondents' Demographics.

Demographic Information	Categories	Frequency (n)	Percentage (%)
Living arrangement	Owner	86	58.1
	Tenant	62	41.9
Property usage of building owner	Live in the property	30	20.3
	Rent it out to tenants	48	32.4
	Live in and at the same time rent out to tenants	8	5.4

Table 4.1 (Continued)

Demographic Information	Categories	Frequency (n)	Percentage (%)
Tenants live in the property	Less than 1 year	21	14.2
	1-5 years	19	12.8
	6-10 years	12	8.1
	11-15 years	5	3.4
	More than 16 years	5	3.4
Owners live in the property	Less than 1 year	4	2.7
	1-5 years	7	4.7
	6-10 years	13	8.8
	11-15 years	4	2.7
	More than 16 years	2	1.4
Owner rent out to tenants	Less than 1 year	6	4.1
	1-5 years	15	10.1
	6-10 years	16	10.8
	11-15 years	9	6.1
	More than 16 years	2	1.4
Owner live in and at the same time rent out to tenants	**Live In**		
	Less than 1 year	0	0
	1-5 years	4	2.7
	6-10 years	2	1.4
	11-15 years	2	1.4
	More than 16 years	0	0
	Rent Out		
	Less than 1 year	0	0
	1-5 years	4	2.7
	6-10 years	2	1.4
	11-15 years	2	1.4
	More than 16 years	0	0

Table 4.1 (Continued)

Demographic Information	Categories	Frequency (n)	Percentage (%)
Gender	Male	76	51.4
	Female	72	48.6
	21 years old to 30 years old	68	45.9
	31 years old to 40 years old	37	25.0
	41 years old to 50 years old	21	14.2
	51 years old and above	22	14.9
Ethnicity	Malay	47	31.8
	Chinese	63	42.6
	Indian	35	23.6
	Others	3	2.0
Employment Status	Unemployed	5	3.4
	Employed	84	56.8
	Self-employed	30	20.3
	Student	21	14.2
	Retired	8	5.4
Education Level	High School	23	15.5
	Sijil Pelajaran Malaysia (SPM) / GCE O-Level / equivalent	11	7.4
	Sijil Tinggi Persekolahan Malaysia (STPM) / GCE A-Level / equivalent	8	5.4
	Foundation	12	8.1
	Diploma	22	14.9
	Bachelor's Degree	60	40.5
	Master's Degree	7	4.7
	PhD	5	3.4

Table 4.1 (Continued)

Demographic Information	Categories		Frequency (n)	Percentage (%)
Income Level	RM 5,249 and below (B40)		37	25.0
	RM 5,250 to RM 11,819 (M40)		72	48.6
	RM 11,820 and above (T20)		39	26.4
Married Status	Single		80	54.1
	Married		56	37.8
	Divorced		12	8.1
Living With Children	Yes		86	58.1
	No		62	41.9
Residential Area	Urban Area	Kuala Lumpur	30	20.3
		Cheras	17	11.5
		Petaling Jaya	12	8.1
		Bangsar	1	0.7
		Subang Jaya	12	8.1
		Shah Alam	11	7.4
		Putrajaya	5	3.4
		Kajang	13	8.8
		Puchong	5	3.4
	Suburban Area	Ampang	1	0.7
		Kepong	8	5.4
		Setapak	2	1.4
		Sungai Buloh	6	4.1
		Semenyih	7	4.7
		Rawang	3	2.0
		Seri Kembangan	1	0.7
		Klang	3	2.0
		Sepang	1	0.7
		Bangi	1	0.7
	Rural	Dengkil	3	2.0
		Banting	3	2.0
		Jenjarom	2	1.4
		Gombak	1	0.7

Table 4.1 (Continued)

Demographic Information	Categories	Frequency (n)	Percentage (%)
Property Age	Less than 5 years	29	19.6
	5 – 10 years	52	35.1
	11 – 15 years	37	25.0
	16 – 20 years	23	15.5
	More than 21 years	7	4.7
Built-Up Size	Below 500 sq ft	5	3.4
	500 to 800 sq ft	19	12.8
	801 to 1,100 sq ft	51	34.5
	1,101 to 1,400 sq ft	33	22.3
	1,401 to 1,700 sq ft	16	10.8
	1,701 to 2,000 sq ft	12	8.1
	2,001 to 2,300 sq ft	6	4.1
	2,301 to 2,600 sq ft	6	4.1
Number of Unit	0 – 299 units	42	28.4
	300 – 599 units	63	42.6
	600 – 999 units	25	16.9
	More than 1000 units	16	10.8
	Not sure	2	1.4

Table 4.1 presents an overview of the demographic information of the survey respondents. A majority of 58.1% are building owners, while 41.9% are tenants. Among the building owners, 20.3% reside in the property, 32.4% rent it out to tenants, and 5.4% both live in and rent out the property. As for tenants, 14.2% have lived in their property for less than a year, 12.8% for 1-5 years, 8.1% for 6-10 years, 3.4% for 11-15 years, and 3.4% for more than 16 years. Among building owners who live in the property, the duration of residence includes less than a year (2.7%), 1-5 years (4.7%), 6-10 years (8.8%), 11-15 years (2.7%), and more than 16 years (1.4%). For building owners who rent out their property, the rental duration consists of less than a year (4.1%), 1-5 years (10.1%), 6-10 years (10.8%), 11-15 years (6.1%), and more than 16 years (1.4%).

For building owners who both live in and rent out their property to tenants, the data revealed the following durations of residence. Among these owners, 2.7% have lived in their property for 1-5 years, while 1.4% have lived there for 6-10 years and 11-15 years. There were no owners who have lived in the property for less than a year and more than 16 years. Similarly, when renting

out the property, 2.7% have rented it for 1-5years, 1.4% for 6-10 years, and 1.4% for 11-15 years. Again, there were no owners who have rented out their property for less than a year and more than 16 years.

The respondents are relatively balanced in terms of gender, with 76 males and 72 females. The majority fall within the 21 to 30 years old age group (45.9%), followed by 25.0% in the 31 to 40 years old range. The remaining respondents are from the 41 to 50 years old (14.2%) and 51 years and above (14.9%) age groups. In terms of ethnicity, 63 respondents are Chinese, 47 are Malay, 35 are Indian, and 3 respondents belong to other ethnic groups. Regarding employment status, 56.8% of respondents are employed, 20.3% are self-employed, 14.2% are students, 5.4% are retired, and 3.4% are unemployed.

In terms of educational qualifications, 40.5% hold a bachelor's degree, 15.5% have completed high school, 14.9% have a diploma, and 8.1% have a foundation qualification. A smaller proportion has completed SPM/GCE O-Level (7.4%), STPM/GCE A-Level (5.4%), master's degree (4.7%) and with a 3.4% holding a PhD. In addition, income levels show that 48.6% of respondents earn between RM5,250 and RM11,819, while 25.0% earn below RM5,250, and 26.4% earn above RM11,820. For marital status, 54.1% of the respondents are single, 37.8% are married, and 8.1% are divorced. A majority, 58.1%, live with children, while 41.9% do not.

The respondents are distributed across a range of residential areas. In urban areas, the majority of respondents reside in Kuala Lumpur (20.3%), followed by Cheras (11.5%), Petaling Jaya (8.1%), and Subang Jaya (0.7%). Other urban areas include Shah Alam (7.4%), Kajang (8.8%), Puchong (3.4%), Putrajaya (4.0%), while a smaller proportions living in Bangsar (0.7%). In sub-urban areas, the respondents are dispersed across locations such as Kepong (5.4%), Sungai Buloh (4.1%), and Semenyih (4.7%). The remaining respondents in suburban areas live in Rawang (2.0%), Seri Kembangan (0.7%), and Klang (2.0%). In rural areas, respondents are located in Dengkil (2.0%), Banting (2.0%), Jenjarom (1.4%) and Gombak (0.7%).

Regarding property age, 19.6% of respondents live in buildings less than 5 years old, 35.1% live in buildings between 5 to 10 years old, and 25.0% in buildings aged 11 to 15 years. Additionally, 15.5% of respondents live in

buildings aged between 16 to 20 years, while 4.7% reside in properties that are more than 21 years old. The built-up size of the buildings varies, with 3.4% of respondents living in buildings under 500 sq ft, 12.8% in buildings ranging from 500 to 800 sq ft, and 34.5% in buildings between 801 to 1,100 sq ft. Other respondents live in buildings sized between 1,101 to 1,400 sq ft (22.3%), 1,401 to 1,700 sq ft (10.8%), and 1,701 to 2,000 sq ft (8.1%). Smaller proportions live in buildings sized between 2,001 to 2,300 sq ft (4.1%) and 2,301 to 2,600 sq ft (4.1%).

Moving on to the number of units in their buildings, 28.4% of respondents live in buildings with 0 to 299 units, 42.6% reside in buildings with 300 to 599 units, and 16.9% live in buildings with 600 to 999 units. A smaller proportion, 10.8%, live in buildings with more than 1,000 units, and 1.4% are unsure about the number of units in their building.

4.3 Cronbach's Alpha Reliability Test

Cronbach's Alpha Reliability Test was conducted to evaluate the reliability of the data collected from 148 respondents from high-rise residential buildings. Based on Table 4.2, the Cronbach's Alpha values for the importance of incorporating ESG practices, the criteria for incorporating ESG practices, and the level of ESG practice adoption were 0.895, 0.925, and 0.893, respectively. As a rule of thumb, a Cronbach's Alpha value greater than 0.8 indicates good internal consistency (Hansali, Zhang and Maleh, 2024). Therefore, these results demonstrate that the data collected in this study are highly reliable and suitable for further analysis.

Table 4.2: Reliability Statistics of ESG Practice from Building Occupants' Perspective

Section	Number of Items	Cronbach's Alpha Values
Section B: The Importance of Incorporating ESG Practices from a Building Occupant's Perspective	18	0.895
Section C: The Criteria of Incorporating ESG Practices from Building Occupant's Perspective	23	0.925
Section D: The Adoption Level of ESG Practices from Building Occupant's Perspective	23	0.893

4.4 Arithmetic Mean Test

The Arithmetic Mean test was applied to data collected from 148 respondents to evaluate the importance, criteria, and adoption levels of ESG practices. Furthermore, comparisons were made between tenants and building owners regarding the importance and criteria of ESG practices. The adoption levels of ESG practices were further analysed, with a particular focus on variables such as residential area categories and property age. The findings from these analyses are discussed in detail in the subsequent sections of the study.

4.5 The Importance of Incorporating ESG Practices from a Building Occupant's Perspective.

4.5.1 Mean Ranking for Importance of Incorporating ESG Practices

As depicted in Table 4.3, the mean scores for the 18 elements related to the importance of incorporating ESG practices were ranked accordingly. Elements with higher mean values were perceived as more important by building occupants, indicating their greater significance compared to those with lower mean values.

Table 4.3: Overall Mean Ranking of the Importance of Incorporating ESG Practices

Code	Importance of ESG Practices	Mean	Ranking
P14	Improve safety and security	4.18	1
P1	Enhance health and well-being	4.14	2
P2	Improve energy efficiency	3.97	3
P13	Reduce cost	3.95	4
P18	Minimise waste	3.91	5
P11	Enhance water efficiency	3.89	6
P12	Increase legal protection	3.89	6
P15	Provide affordable housing	3.87	8
P10	Reduce risk	3.85	9
P6	Increase property value	3.82	10
P17	Reduce tenant turnover	3.80	11
P4	Increase marketability and demand	3.80	11
P3	Reduce social problem	3.78	13
P16	Enhance transparency and trust	3.76	14
P9	Preserve natural resource	3.70	15
P5	Able to access to tax incentives	3.66	16
P7	Able to obtain green financing	3.51	17
P8	Build positive reputation	3.49	18

In accordance with Table 4.3, the ESG practices with the highest mean ranking was **P14** = “Improve Safety and Security”, with a mean value of 4.18. This highlighted that personal safety has become a significant concern among occupants, which corresponded with the findings of Sellathurai (2020). A secure living environment is crucial for occupant well-being, as it directly influenced their peace of mind and overall quality of life (Wang and Wang, 2023). Furthermore, Riratanaphong and Pewklieng (2025) emphasised that ESG practices provided building occupants with the necessary tools to assess critical security features, such as surveillance systems and access control mechanisms, which contributed to reducing crime risks and enhancing the occupants' sense of safety. Moreover, buildings that prioritised safety foster a stronger sense of community, as occupants felt more secure and supported in their living environment (Dong *et al*., 2023). This finding is consistent with Wang and Xue (2024), who also identified safety and security as a key priority for building occupants within ESG practices.

The second highest ranking ESG practice was **P1** = "Enhance Health and Well-being," with a mean value of 4.14. This suggested that occupants were aware of the significance and positive impact of health and well-being within ESG practices, as the environment of their property could directly influence an individual's health (Kaushik *et al*., 2022). Ahmed (2022) divulged that ESG practices often considered elements such as indoor air quality, lighting, thermal comfort, and access to natural surroundings, all of which contributed to healthier and more productive indoor environments. In particular, poor IAQ was identified as a major concern, with several occupants linking it to issues like Sick Building Syndrome (SBS), which could lead to discomfort and decreased productivity (Mansor *et al*., 2024). This finding was consistent with the results of Ifediora and Nwosu (2024), where health and well-being were ranked as the most important ESG practices by building occupants in residential buildings.

The third highest-ranking ESG practice was **P2** = "Improve Energy Efficiency," with a mean value of 3.97. This result highlighted that enhancing energy efficiency had become a significant concern for respondents. This was because residential areas often exhibited high levels of electrical appliance usage, which led to increased energy consumption and costs (Paurnami, 2021). In response, ESG practices that incorporated features such as better ventilation, natural lighting, and improved thermal comfort were identified by respondents as key strategies for reducing energy consumption and improving the overall living environment (Bera *et al*., 2024). Furthermore, the energy savings generated from these practices translated into lower utility bills, providing significant financial benefits to building occupants (Papadakis and Katsaprakakis, 2023). This finding was consistent with the results of Olteanu and Ionascu (2023), who also found that energy efficiency was highly prioritised by building occupants in Romania when evaluating ESG practices..

Conversely, **P8** = "Build Positive Reputation" was ranked the lowest among all ESG practices, with a mean score of 3.49. This may have been due to the fact that occupants prioritised direct and practical benefits over intangible outcomes such as corporate image. A similar pattern was observed by Chia *et al*. (2016), who found that occupants in Kota Kinabalu were not particularly focused on reputation and were more concerned with the tangible features and

value offered by owners. Salleh *et al.* (2019) also reported that occupants tended to focus on an owner's performance rather than its reputation. These findings unequivocally indicated that building occupants were more likely to support ESG practices when they led to tangible, functional improvements rather than solely enhancing a building owner's reputation.

The next lowest mean ranking was **P7** = "Able to Obtain Green Financing," with a mean value of 3.51. The ranking could be attributed to the fact that the green concept remained a relatively new norm in Malaysia. There was a lack of awareness, standardisation, and clear financial incentives associated with green financing in Malaysian real estate projects (Kamal *et al*., 2024). Furthermore, green financing was often perceived as less appealing due to higher issuance costs and lower returns compared to traditional financing options, making it less attractive to building occupants (Akomea-Frimpong *et al*., 2022). As a result, green financing held a lower priority for building occupants in high-rise residential buildings, primarily due to limited awareness and perceived profitability. Habib *et al*. (2025) further supplemented that the demand for green financing was expected to rise significantly in the future as both occupants and developers began to recognise its long-term benefits for sustainability and cost efficiency.

4.5.2 Comparison of Mean Rankings for the Importance of Incorporating ESG Practices by Building Owners and Tenants

Table 4.4 demostrates the overall mean rankings of practices related to the importance of incorporating ESG practices from both tenants and owners perspectives. The highest-ranked practices were considered to have the most significant influence on ESG integration, emphasising key priorities for future sustainability decisions in property management.

Table 4.4: Comparison of Mean Rankings for the Importance of Incorporating ESG Practices by Building Owners and Tenants.

Code	Importance of ESG Practices	Building Owner		Tenants	
		Mean	Ranking	Mean	Ranking
P1	Enhance health and well-being	3.99	1	4.34	2
P14	Improve safety and security	3.93	2	4.52	1
P13	Increase legal protection	3.88	3	4.03	8
P2	Improve energy efficiency	3.77	4	4.24	4
P4	Increase property value	3.74	5	3.87	12
P3	Increase marketability and demand	3.73	6	3.84	14
P11	Minimise waste	3.73	6	4.10	7
P10	Reduce risk	3.72	8	4.03	8
P6	Reduce tenant turnover	3.72	8	3.95	11
P16	Preserve natural resource	3.72	8	3.81	15
P15	Enhance water efficiency	3.70	11	4.11	6
P5	Able to access to tax incentives	3.69	12	3.63	16
P17	Reduce social problem	3.67	13	3.98	10
P18	Reduce cost	3.66	14	4.24	4
P7	Build positive reputation	3.60	15	3.39	18
P9	Enhance transparency and trust	3.57	16	3.87	12
P12	Provide affordable housing	3.57	16	4.32	3
P8	Able to obtain green financing	3.52	18	3.45	17

Table 4.4 shows that **P1** = "Enhance health and well-being", tenants ranked it 2nd with a mean score of 4.34, higher than building owners' ranking of 1st with a mean of 3.99. Although building owners ranked it higher, their mean value was still slightly lower than tenants'. This difference could be explained by the direct and personal impact that health and well-being had on tenants' daily lives. Since tenants spent most of their time in their homes, factors such as good air quality, natural light, and low noise levels significantly affected their satisfaction and quality of life (Manna and Al-Ghamdi, 2021). In contrast, building owners were not directly impacted by living conditions in the same way tenants were. Grewal *et al.* (2024) revealed that owners focused on tenant health and well-being as a long-term investment, which positively impacted tenant retention and ultimately enhanced property value. This aligned with the findings of Oswald, Moore and Baker (2020), who emphasised that tenants prioritised health and well-being more than owners.

Besides, **P14** = "Improve safety and security", tenants ranked it 1st with a mean score of 4.52, significantly higher than building owners' ranking of 2nd with a mean score of 3.93. For tenants, a safe and secure living environment is essential for their well-being and peace of mind (Blunden, 2023). When tenants felt secure, it enhanced their overall quality of life and reduced stress and anxiety, which positively impacted their physical and mental health (Holding *et al*., 2020). Conversely, building owners assigned a lower mean value than tenants, as their primary concern with safety was often tied to the long-term value and profitability of the property (Chello and Himick, 2024). This was further corroborated by Chello and Himick (2024), who avowed that building owners' focus was more on ensuring safety measures were in place to protect their investment, rather than an immediate concern for personal well-being. This was echoed by the study of Nor, Aziz and Zyed (2020), who asserted that tenants consistently prioritised improving safety and security within properties.

Further, **P12** = "Provide affordable housing" ranked 3rd for tenants, which is higher than building owners' ranking of 16th. This result revealed that tenants placed greater importance on the affordability of housing, as it directly impacted their financial stability. Ahmed and Salam (2022) asserted that rent often constituted a significant portion of a tenant's monthly expenses, and

affordable housing helped ensure they could cover other essential needs, such as food, utilities, and transportation. In contrast, building owners placed less importance on affordability, as their housing costs were influenced by mortgage payments and property taxes (Cermakova and Hromada, 2022). In view of this, Cook *et al.* (2024) accentuated that owners managed these expenses by generating rental income and benefiting from property value appreciation, which helped offset these costs. This was also reflected in **P4**, where owners ranked property value higher than tenants. Consequently, the results of this study aligned with the findings of Hilber and Schoni (2022), which highlighted that tenants placed greater importance on affordable housing for their financial security.

In relation to this, tenants ranked **P4** = "Increase property value" lower (rank = 12) compared to owners (rank = 5). This ranking could be attributed to tenants' concern that rising property values were often coupled with higher rents, which undermined housing affordability (Coulson *et al*., 2025). Given that tenants were responsible for recurring rental payments, they were more focused on securing affordable housing in the short term. In contrast, building owners were more concerned with increasing property value as it directly impacted investment returns, rental income, and resale potential (Sharma, 2024). These findings aligned with Hilber and Schoni (2022), who observed that owners prioritised property value due to its long-term financial benefits, whereas tenants were more concerned with immediate affordability.

Moreover, **P18** = "Reduce cost" received a significantly higher ranking from tenants, placing 4th, compared to building owners who ranked it 14th. This indicated that tenants placed greater emphasis than owners on cost reduction due to its direct impact on their financial stability and daily living conditions (Brown *et al*., 2020). This was because rent, utilities, and maintenance costs significantly impacted their ability to afford other necessities and pursue their lifestyle choices. This focus was further reflected in the higher rankings of **P15** = "Enhance water efficiency" and **P2** = "Improve energy efficiency," as tenants recognised these measures helped reduce their monthly bills. In contrast, building owners placed less emphasis on cost reduction, as they could potentially offset expenses through rental income and the long-term

appreciation of the property's value (Balzarini and Boyd, 2021). However, this finding contrasted with Koch (2024), who highlighted that building owners who occupied the property prioritised cost reduction over property value.

A significant difference between tenants and owners was evident in their rankings of **P13** = “Increase legal protection” and **P16** = "Preserve natural resources." Tenants ranked **P13** lower, placing it 8th, while owners ranked it 3rd. Chisholm, Howden-Chapman and Fougere (2020) stipulated that tenants were primarily concerned with the immediate security of their living conditions and the specific rights outlined in their tenancy agreements. In contrast, building owners viewed legal protection more broadly, extending beyond tenancy agreements to include compliance with environmental regulations such as water conservation, energy efficiency, and waste reduction (Shapsugova, 2023). This was due to the fact that non-compliance with these regulations could lead to legal penalties, loss of certification, and reputational damage, making legal protection a more pressing concern for owners (Akinsola, 2025). Consequently, owners placed greater emphasis on preserving natural resources (**P16**), ranking it higher (rank = 8), as such conservation was often required by these regulations (Zdyb, 2020).

On the other hand, **P8** = "Able to obtain green financing" was ranked 17th by tenants, with a mean score of 3.45, which is slightly higher than the building owners’ ranking of 18th, with a mean score of 3.52. Akomea-Frimpong *et al.* (2022) asserted that building owners had the potential financial benefits of green financing, such as reduced operational costs and eligibility for government incentives, which could contribute to long-term profitability and property value enhancement. However, tenants were less likely to perceive these benefits as they were not involved in the financing decisions of the property (Power and Gillon, 2022). Additionally, Kamal *et al*. (2024) highlighted that building owners perceived green financing as less attractive due to the high upfront costs and long payback periods, which further explained why owners assigned relatively low priority to this element.

4.6 Criteria of Incorporating ESG Practices from Building Occupants' Perspective

4.6.1 Mean Ranking for Criteria of Incorporating ESG Practices

As presented in Table 4.5, the mean rankings for the criteria of incorporating ESG practices from building occupants perspective. A total of 23 ESG criteria were ranked based on their mean scores, with higher values indicating greater importance to occupants. Consequently, this ranking offers insight into the ESG practices most valued by occupants, emphasising their significance relative to criteria with lower mean scores.

Table 4.5: Mean Ranking of Criteria in Incorporating ESG Practices.

Code	ESG Criteria	Mean	Ranking
S5	Install security system to safeguard the occupants	4.17	1
E1	Use of energy-efficient technology	4.10	2
E8	Encourage public transport usage	4.07	3
S1	Adopt ventilation system to ensure the indoor air quality	4.01	4
S4	Minimise noise disturbances	3.99	5
S8	Construct affordable housing	3.96	6
S3	Optimise thermal comfort	3.95	7
S2	Adopt natural lighting system	3.95	7
G2	Comply with regulations	3.94	9
E2	Implement waste management practice	3.89	10
S7	Practice inclusive design	3.86	11
G3	Establish effective channels for communication	3.85	12
E3	Practice water conservation	3.84	13
G5	Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability	3.84	13
G4	Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably	3.81	15

Table 4.5 (Continued)

G6	Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment	3.78	16
E6	Use of renewable energy	3.72	17
E4	Use of sustainable material	3.65	18
E5	Practice biodiversity protection	3.62	19
E9	Adopt green lease	3.57	20
G1	Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency	3.47	21
E7	Use of green rating tool	3.43	22
S6	Organise social activities	3.39	23

As shown in Table 4.5, the highest-ranked ESG practice from a building occupant's perspective was **S5** = "Installation of security systems to safeguard the occupants," with a mean score of 4.17 and ranked 1st. This criterion reflected the fundamental importance of safety in high-rise residential properties. The installation of security systems, such as surveillance cameras, access control, and fire safety measures, was a fundamental aspect of ESG practices, directly impacting tenants' sense of security and overall quality of life (Riratanaphong and Pewklieng, 2025). In view of this, a secure environment not only enhanced tenants' well-being but also contributed significantly to tenant retention and the long-term value of the property (Thanaraju *et al*., 2019). Furthermore, buildings prioritising safety fostered a sense of community and trust, which tenants valued highly (Dong *et al*., 2023). This finding aligned with Liow (2024), emphasising that occupants were more likely to remain in properties that ensured their safety, thereby reinforcing the significance of security as a key ESG criterion.

The second-highest priority for building occupants was **E1** = "Use of energy-efficient technology," with a mean score of 4.10, ranked 2nd. This criterion included measures such as LED lighting, smart thermostats, and high-efficiency appliances, which not only contributed to environmental sustainability but also provided cost savings for tenants through lower utility

bills (Sofos *et al*., 2020). Consequently, the use of energy-efficient technology was highly valued as it provided both immediate financial savings and long-term environmental benefits, making it a practical and impactful criterion for occupants (Noga, 2024). In addition, incorporating energy-efficient technology also enhanced the building's marketability and tenant satisfaction (Ober, 2024). This finding aligned with Ifediora and Igwenagu (2024), who discovered that occupants of residential buildings ranked energy efficiency relatively high in ESG practices.

The third highest mean ranking was **E8** = "Encourage public transport usage," with a mean value of 4.07. The results of this study were consistent with the findings of Ifediora and Igwenagu (2024), where public transport access was similarly ranked highly by occupants. For building occupants, public transport was valued for its ability to reduce commuting costs, provide convenient access to essential services, and minimise environmental impact (Chen, 2024). Furthermore, properties with robust ESG credentials, including proximity to public transportation, were likely to command higher rents and experience lower vacancy rates, thereby increasing their market value (Scherrenberg, Wessels and Nelisse, 2024). Thus, public transport access was essential within the ESG criteria from the building occupants' perspective, as it significantly contributed to tenant well-being and the long-term sustainability of the property.

Furthermore, **E7** = "Use of green rating tools," such as LEED and BREEAM, ranked second-lowest, with a mean value of 3.43. This reflected a relatively low priority given to these tools by building occupants within the ESG criteria. However, this contrasted with the findings from Liu (2025), who revealed that building occupants in London often prioritised green rating tools such as BREEAM, as such certifications signified a commitment to sustainable practices, leading to positive impacts on building performance and occupant well-being. Similarly, Olteanu and Ionascu (2023) also showed the opposite results, where green building certification was generally ranked highly by building occupants.

On the other hand, **S6** = "Organising social activities" ranked lowest among the ESG practices, with a mean value of 3.39. These results indicated that building occupants placed relatively low importance on community

engagement through social events. This could be attributed to occupants often prioritising other commitments, such as work, family, and personal interests, rather than social events, particularly when these activities were perceived as less directly relevant to their immediate needs (Argentzell *et al.,* 2022). Additionally, occupants preferred informal forms of interaction, such as casual hallway conversations or online discussions, rather than more structured social events (Vries, 2025). However, Olteanu and Ionascu (2023) revealed that building occupants prioritised efforts to improve community engagement around buildings, which contrasted with the findings of this study.

4.6.2 Comparison of Mean Rankings for ESG Practice Criteria by Building Owners and Tenants

The overall mean rankings of the criteria for incorporating ESG practices from the perspectives of both tenants and building owners are presented in Table 4.6. The criteria with the highest rankings are identified as having the greatest influence on the integration of ESG practices, highlighting the differing priorities between tenants and owners.

Table 4.6: Comparison of Mean Rankings for ESG Practice Criteria by Building Owners and Tenants.

Code	Criteria of ESG Practices	Building Owner		Tenants	
		Mean	Ranking	Mean	Ranking
S5	Install security system to safeguard the occupants	3.97	1	4.45	1
E8	Encourage public transport usage	3.94	2	4.24	4
E1	Use of energy-efficient technology	3.92	3	4.35	2
S4	Minimise noise disturbances	3.86	4	4.18	9
S2	Adopt natural lighting system	3.84	5	4.11	13
S1	Adopt ventilation system to ensure the indoor air quality	3.81	6	4.27	3
S8	Construct affordable housing	3.79	7	4.19	8
S3	Optimise thermal comfort	3.77	8	4.21	5
G2	Comply with regulations	3.74	9	4.21	5
G6	Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment	3.73	10	3.85	16
G5	Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability	3.71	11	4.03	15
S7	Practice inclusive design	3.67	12	4.13	12
E2	Implement waste management practice	3.66	13	4.21	5
E3	Practice water conservation	3.64	14	4.13	11
E5	Practice biodiversity protection	3.64	14	3.60	20
G3	Establish effective channels for communication	3.64	14	4.15	10

Table 4.6 (Continued)

Code	Criteria of ESG Practices	Building Owner		Tenants	
		Mean	Ranking	Mean	Ranking
E6	Use of renewable energy	3.63	17	3.85	16
E9	Adopt green lease	3.60	18	3.52	21
G4	Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably	3.60	18	4.10	14
E4	Use of sustainable material	3.59	20	3.73	18
E7	Use of green rating tool	3.45	21	3.40	22
S6	Organise social activities	3.40	22	3.37	23
G1	Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency	3.35	23	3.65	19

Table 4.6 presents a comparison of the mean rankings for criteria of incorporating ESG practices between building owners and tenants. The "installation of security systems to safeguard the occupants" **(S5)** was ranked 1st by both building owners and tenants. However, the noticeable difference in mean values indicated that tenants placed a slightly higher value on security systems, with a mean value of 4.45, compared to owners, whose mean value was 3.97. Ashur and Aishah (2024) mentioned that tenants likely prioritised security as it impacted their daily lives and overall well-being, contributing significantly to their peace of mind and satisfaction. In contrast, for owners, security systems reduced liability risks, lowered insurance premiums, and enhanced the overall value and attractiveness of the property, making it more desirable to potential tenants (Bate, 2020). Nonetheless, this was consistent with the findings of Wang, Huang and Yao (2023), who identified that occupants were more concerned with the installation of security systems.

Besides that, the "Encourage public transport usage" (**E8**), where owners ranked 2nd, while tenants ranked it 4th. This ranking highlighted that building owners placed greater emphasis on promoting public transport usage compared to tenants. This was due to the fact that public transport access could significantly increase property values, potentially by 0.1% to 39%, making properties more attractive due to the added convenience and connectivity (Suhaimi, Maimun and Fazira, 2021). On the other hand, tenants might have perceived the benefits of public transport as secondary to the time spent waiting for or transferring between transport options, which could have been seen as inconvenient (Kroen, Pemberton and Gruyter, 2023). However, this contrasted with the findings of Bouzouina *et al*. (2021), who identified that tenants placed more emphasis on public transport accessibility than building owners.

Furthermore, "Use of energy-efficient technology" (**E1**), with building owners ranking it 3rd and tenants ranking it 2nd. This indicated that building owners ranked it lower, while tenants ranked it higher, due to the "split incentive" problem and the owner-tenant dilemma. Lang *et al*. (2021) asserted that building owners might not have directly benefited from energy savings if tenants were responsible for paying their energy bills, thereby reducing their incentive to invest in energy-efficient technologies. In contrast, tenants, who

were directly impacted by energy costs, placed a higher value on energy-efficient technology, such as smart thermostats, LED lighting, and efficient appliances, as these technologies could significantly lower their electricity and water bills (Olatunde, Okwandu and Akande, 2024). Moreover, the upfront costs of installing energy-efficient technologies may have deterred building owners, while tenants prioritised the immediate comfort and cost savings that such technologies offered (Khan *et al*., 2024). This was parallel with the findings of Reutter (2024), which showed that tenants placed more emphasis on the use of energy-efficient technology compared to owners.

Moreover, tenants ranked **S2** = "Adopt natural lighting system" 13th, which is lower than building owner of ranking 5th. Knoop *et al.* (2020) discovered that tenants often feel less control over it compared to artificial lighting, as they cannot easily adjust its intensity or direction. Moreover, tenants might not have directly benefited from the energy savings associated with natural light if they did not pay the building's energy bills (Papinutto *et al*., 2022). In contrast, building owners could significantly reduce reliance on artificial lighting, leading to lower energy consumption and operational costs (Moghayedi, Hubner and Michell, 2023). This translated into long-term financial savings and enhanced property value, as buildings with energy-efficient features were more attractive to environmentally conscious tenants (Almusaed, Almssad and Yitmen, 2023). However, these results contradicted those of Robinson *et al.* (2016), who found that tenants were willing to pay a premium for access to natural light, as it enhanced their quality of life and positively affected mood.

The difference in rankings for **E2** = "Implement waste management practice", with tenants ranking it 5th and owners ranking it 13th. For tenants, waste management had a direct impact on their living environment, with poor waste practices often leading to issues such as odors, pest infestations, and unsanitary conditions (Qasim *et al*., 2020). These immediate effects made waste management a higher priority for tenants, as it directly affected their comfort and well-being (Bouabdallaoui, 2024). Additionally, waste management made it easier for tenants to dispose of waste properly and contributed to a cleaner, more comfortable living space (Muiruri, 2022). On the other hand, building

owners were often found to rank waste management lower in their priorities, which was often linked to a lack of social support and awareness about the importance of proper waste management (Debnath *et al*., 2023). This was in line with Oyewole, Komolafe and Gbadegesin (2021), who found that tenants placed greater emphasis on waste management.

Both tenants and owners ranked **E9** = "Adopt green lease" relatively low, with tenants placing it 21st and owners ranking it 18th. Nguyen *et al.* (2023) asserted that the lower ranking might have reflected the complexity involved in implementing such agreements, as well as a lack of awareness regarding their potential to enhance energy efficiency and reduce operational costs. Conversely, owners could have benefited from green leases by attracting tenants who prioritised sustainability, potentially leading to higher occupancy rates and longer lease terms (Huszar, 2023). Additionally, implementing green lease practices resulted in long-term cost savings for building owners through reduced energy and water consumption (Yang, Guevara-Ramirez and Bisson, 2020). This was in line with Adnan *et al.* (2017), who discovered that green leases were often hindered by long payback periods for retrofits and a lack of incentives to build new, which could have contributed to the overall reluctance to prioritise them.

The low ranking of **E7** = “Use of green rating tools,” with building owners ranking it 21st and tenants ranking it 22nd, indicated that tenants placed slightly less emphasis on it than owners. Green rating tools were less prioritised by both tenants and owners due to a lack of awareness and understanding (Obaito, Ishiyaku and Violet, 2022). Shibani *et al*. (2021) further supplemented that building owners were more likely to adopt green building rating tools, as certification and long-term benefits were directly tied to their ownership and operational responsibilities. This aligned with the findings of Zhao, Wang and Liu (2021), who observed that tenants generally assigned lower priority to the use of green rating tools.

Furthermore, the low rankings for **S6** = “Organise social activities”, with tenants ranking it 23rd and building owners 22nd. Tenants often face demanding commitments such as work, studies, or family responsibilities, which limited their time and energy for social engagement (Nguyen *et al*., 2021).

Conversely, building owners were often concerned about potential noise complaints, liability issues, and safety hazards that tenant gatherings might have created, as these could have disrupted other residents and violated building regulations (Sentop and Rasmussen, 2025). Therefore, these results aligned with Costarelli, Kleinhans and Mugnano (2020), who observed tenants' lack of willingness to participate in social activities.

Meanwhile, **G1** = "Adoption of the Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency" is ranked 23rd by building owners and 19th by tenants. These results indicated that both tenants and owners assigned relatively low priority to this criterion, primarily due to a lack of awareness and understanding of the significance and benefits of these frameworks (Pang, 2024). Nevertheless, tenants placed slightly higher importance on GRI adoption as it enhanced transparency and built their trust in a property's environmental and social responsibility, which influenced their decisions to rent or renew leases (Mantyla, 2025). Moreover, this finding aligned with the study of Bais, Nassimbeni and Orzes (2024), which highlighted that both tenants and owners generally prioritised GRI adoption lowly.

4.7 The Adoption Level of ESG Practices from Building Occupant's Perspective.

4.7.1 Mean Ranking for Adoption of ESG Practices

Table 4.7 unveils the overall mean rankings for the adoption of ESG practices. Accordingly, the mean scores for the 23 ESG practices are arranged, with higher mean values indicating greater adoption by building occupants. Therefore, ESG practices with higher mean value are considered more significant compared to those with lower mean value.

Table 4.7: Mean Ranking for Adoption Level in ESG Practices.

Code	Adoption Level of ESG Practices	Mean	Ranking
SA5	Install security system to safeguard the occupants	3.97	1
SA2	Adopt natural lighting system	3.86	2
GA2	Comply with regulations	3.74	3

Table 4.7 (Continued)

EA1	Use of energy-efficient technology	3.71	4
EA8	Encourage public transport usage	3.69	5
SA1	Adopt ventilation system to ensure the indoor air quality	3.68	6
SA3	Optimise thermal comfort	3.68	6
SA4	Minimise noise disturbances	3.64	8
SA7	Practice inclusive design	3.51	9
SA8	Construct affordable housing	3.47	10
GA4	Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably	3.46	11
GA3	Establish effective channels for communication	3.43	12
GA5	Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability	3.33	13
EA2	Implement waste management practice	3.23	14
EA5	Practice biodiversity protection	3.17	15
EA3	Practice water conservation	2.90	16
EA4	Use of sustainable material	2.86	17
GA6	Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment	2.77	18
EA9	Adopt green lease	2.76	19
SA6	Organise social activities	2.57	20
GA1	Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency	2.47	21
EA7	Use of green rating tool	2.38	22
EA6	Use of renewable energy	2.16	23

As shown in Table 4.7, the highest-ranked ESG practice adopted from a building occupant is the **SA5** = “Installation of security systems to safeguard the occupants”, with a mean score of 3.97 and ranked first. This prioritisation aligned with Liow (2024), who found that building occupants highly valued security due to its direct impact on their quality of life. Riratanaphong and Pewklieng (2025) further revealed that the adoption of effective security systems, such as surveillance cameras and access control measures, ensured the physical safety of tenants, thereby fostering a secure living environment. Additionally, installing such systems not only met tenant expectations but also

protected the property from potential threats, contributing to tenant retention and maintaining property value (Nor, Aziz and Zyed, 2020). This finding similarly aligned with Sukeri and Sani (2024), who found that building occupants adopted security measures to ensure their safety.

The second-highest priority for building occupants is **SA2** = "Adopt natural lighting," with a mean value of 3.86 and ranked 2nd. This result indicated that building occupants placed significant value on natural light in their living environments. Bravo and Hernandez (2022) found that building occupants adopted natural daylight as it enhanced their quality of life and positively affected mood. This included incorporating features like large windows, skylights, and reflective surfaces, as well as making personal choices such as strategically placing furniture and ensuring windows were unobstructed (Voronkova and Podlasek, 2024). This finding was similar to Mazli and Fauzi (2022), who found that occupants highly ranked the adoption of window placement to allow inhabitants to benefit from natural lighting.

The third-highest priority for building occupants was **GA2** = "Comply with regulations," ranked 3rd. Sukeri and Sani (2024) and Ghafoor *et al*. (2025) revealed that compliance with safety regulations, such as proper waste disposal and responsible use of communal facilities, ultimately enhanced the quality and safety of residential buildings and safeguarded the well-being of occupants. This compliance also helped building occupants mitigate the risk of penalties or fines associated with environmental regulations. The findings contradicted those of Nor, Aziz and Zyed (2020), who concluded that occupants lacked an understanding of acts, regulations, and house rules in Klang Valley. This lack of awareness contributed to lower adoption rates of compliance practices.

Furthermore, **EA7** = "Use of green rating tools," such as LEED and BREEAM, ranked second-lowest with a rank of 21st, reflecting the relatively low adoption given to these tools by building occupants within the ESG practices. This contrasted with the findings from Liu *et al*. (2025), who revealed that building occupants in London prioritised BREEAM-certified buildings, as such certifications signified a commitment to sustainable practices, leading to positive impacts on building performance and occupant well-being. Similarly,

Laiche *et al.* (2021) also showed opposite results, where green building certification was generally ranked highly and adopted by building occupants.

Apart from that, **EA6** = "Use of renewable energy" ranked the lowest among the practices. The low adoption of renewable energy was attributed to the high initial capital costs and long payback period (Nguyen et al., 2023). Additionally, Poshnath, Rismanchi and Rajabifard (2023) advocated that building owners were less inclined to invest in renewable energy if the tenant was responsible for paying the utility charges. This was because the benefits of energy efficiency and renewable energy, such as reduced utility bills, primarily accrued to the tenant rather than the building owner. These results were consistent with Khoo, Chai and Ha (2023), who concluded that the current adoption rate of renewable energy in Malaysia remained relatively low.

4.7.2 Comparison of Mean Rankings for ESG Practice Adoption by Building Occupants in Urban, Suburban, and Rural Areas

The mean rankings for the adoption of ESG practices, based on geographical areas including urban, suburban, and rural regions, are presented in Table 4.8. The areas with the highest mean scores are considered to have the most significant influence on the adoption of ESG practices.

Table 4.8: Overall Mean Ranking of Adoption of Incorporating ESG Practices Across Different Geographical Areas.

Code	Adoption Level of ESG Practices	Urban		Sub-Urban		Rural	
		Mean	Ranking	Mean	Ranking	Mean	Ranking
SA5	Install security system to safeguard the occupants	4.10	1	3.82	1	3.11	3
SA2	Adopt natural lighting system	4.02	2	3.61	3	3.11	3
EA1	Use of energy-efficient technology	3.87	3	3.55	4	2.56	19
EA8	Encourage public transport usage	3.86	4	3.42	7	2.89	7
SA4	Minimise noise disturbances	3.84	5	3.29	8	2.89	7
SA3	Optimise thermal comfort	3.82	6	3.53	5	2.67	15
SA1	Adopt ventilation system to ensure the indoor air quality	3.80	7	3.45	6	3.33	2
GA2	Comply with regulations	3.78	8	3.76	2	3.11	3
SA7	Practice inclusive design	3.68	9	3.18	13	2.89	7
SA4	Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably	3.61	10	3.21	12	2.78	12
SA8	Construct affordable housing	3.59	11	3.24	10	3.11	3
GA5	Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability	3.50	12	3.03	15	2.67	15
GA3	Establish effective channels for communication	3.49	13	3.29	9	3.44	1
EA5	Practice biodiversity protection	3.30	14	3.03	15	2.33	21
EA2	Implement waste management practice	3.26	15	3.24	10	2.89	7
EA4	Use of sustainable material	3.01	16	2.53	19	2.67	15

Table 4.8 (Continued)

Code	Adoption Level of ESG Practices	Urban		Sub-Urban		Rural	
		Mean	Ranking	Mean	Ranking	Mean	Ranking
EA3	Practice water conservation	2.91	17	3.08	14	2.00	**22**
EA9	Adopt green lease	2.85	18	2.58	18	2.44	20
GA6	Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment	2.77	19	2.76	17	2.78	12
SA6	Organise social activities	2.59	20	2.42	21	2.89	7
GA1	Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency	2.42	21	2.53	19	2.78	12
EA7	Use of green rating tool	2.40	22	2.26	23	2.67	15
EA6	Use of renewable energy	2.15	23	2.29	22	1.67	23

As shown in Table 4.8, **SA5** = "Install security system to safeguard the occupants", ranked 1st in both urban and suburban areas, and 3rd in rural areas. This highlighted that the adoption level of security systems was significantly higher in urban and suburban areas compared to rural ones. Urban and suburban areas in Malaysia often experienced higher population densities and, consequently, may have had higher crime rates than rural areas (Oliveira, 2021). This increased crime risk, particularly for property crimes like theft and burglary, necessitated the need for enhanced property security systems in these areas. This was parallel with Shahbazov, Afandiyev and Balayeva (2023), who advocated that occupants in rural areas were less likely to install security systems, as they tended to perceive a lower risk of crime compared to those in urban settings.

Beside that, rural areas ranked 15th for **SA3** = "Optimising thermal comfort," reflecting the challenges associated with maintaining consistent indoor temperatures. The results of this study aligned with the findings of Ji, Zhang and Fukuda (2024), which highlighted that rural areas generally experienced poorer thermal comfort compared to urban areas. This was likely due to the lack of advanced cooling equipment, as evidenced by the 19th ranking for **EA1** = "Energy-efficient technologies" in rural areas. This finding was also reflected in the results of Li and Hu (2024), where the survey indicated that rural occupants had a relatively low adoption rate of building energy-saving renovations. Consequently, SA1 = "Adopt ventilation systems" was prioritised in rural areas, ranking 2nd, as these systems regulated both air quality and temperature (Lopez-Garcia *et al*., 2022).

Moreover, **GA5** = "Establish clear performance metrics and regular reports" ranked 15th in both rural and suburban areas, indicating that performance reporting was less prioritised compared to urban areas, where it ranked 12th. This lack of focus on performance metrics in rural and suburban regions may have led to a greater reliance on **GA3** = "Effective communication," which ranked 1st in rural areas and 9th in suburban areas. The emphasis on communication was critical as it ensured that occupants remained informed and fostered accountability through direct and transparent channels (Hellgren, 2022). This aligned with the findings of Olajiga *et al*. (2024), who highlighted that

effective communication served as the key tool for promoting engagement and ensuring transparency.

Apart from that, **EA9** = “Adoption of green lease,” ranked 18th in both urban and suburban areas, and 20th in rural areas, highlighted a challenge in prioritising sustainability practices in the property. The limited adoption of green leases in these regions may have contributed to the relatively lower prioritisation of **EA3** = "Water conservation," which ranked 17th in urban areas, 14th in suburban areas, and 22nd in rural areas. Similarly, **EA1** = "Energy-efficient technologies" ranked 3rd in urban areas, 4th in suburban areas, and 19th in rural areas. This was likely because green leases included clauses that promoted environmentally responsible practices, such as water conservation and energy-efficient technologies, thereby incentivising occupants to adopt more sustainable approaches (Wong and Chan, 2024). However, Adnan *et al.* (2017) presented contrasting findings, concluding that occupants in urban areas did not consider green lease practices significant for buildings.

On top of that, **EA8** = "Encourage public transport usage" was ranked highest in urban areas, followed by suburban areas, and then rural areas. Urban areas ranked it 4th, while suburban and rural areas both ranked it 7th. This was due to the fact that public transport was often more developed and extensive in urban areas, offering a viable and convenient alternative to private vehicles (Porru *et al*., 2020). Rahman *et al*. (2023) further supported this by emphasising that Kuala Lumpur benefited from an extensive public transportation network, offering occupants a convenient and sustainable mode of daily commuting. In contrast, suburban areas had less developed public transport systems, leading to a higher reliance on private vehicles (Romero, Zamorano and Monzon, 2023). This finding was also echoed by Porru *et al*. (2020), who found that occupants in rural areas faced limited availability of public transport services compared to urban areas.

Apart from that, **SA8** = "Construct affordable housing" received the highest ranking in rural areas, ranked 3rd, followed by urban areas ranked 11th, and suburban areas ranked 13th. Liu and Ong (2021) asserted that rural areas often had lower land costs and less stringent development regulations, resulting in lower housing prices and greater opportunities for affordable housing. The

slower pace of development and lower population density in rural areas further contributed to their prioritisation of affordability (Umair *et al*., 2024). In contrast, suburban areas adjacent to urban areas experienced higher land use demands for development and increased land costs, making them less affordable than rural locations (Wei *et al*., 2025). As the urban population continued to grow, land scarcity led to a significant increase in property prices, making housing increasingly unaffordable for many urban occupants (Daud, Rosly and Sori, 2022).

The differing rankings for **EA7** = "Use of green rating tool", with urban areas ranked 22nd, suburban areas 23rd, and rural areas 15th. This can be attributed to the lack of awareness among occupants in Malaysia regarding the benefits and significance of green rating tools. Obaito, Ishiyaku and Violet (2022) asserted that many occupants were unfamiliar with sustainability certifications and often perceived them as technical or irrelevant to their daily living experience. This limited understanding contributed to the consistently low emphasis placed on green rating tools regardless of location. However, it was noticeable that rural areas ranked higher compared to urban and suburban areas. This result contrasted with findings by Cheng and Mao (2024), who reported that urban occupants tended to be more proactive in environmental practices compared to rural occupants. Similarly, Leong *et al*. (2021) also found that rural occupants lacked attention to the use of green rating tools.

The consistently low ranking of **EA6** = "Use of renewable energy," ranked 23rd in both urban and rural areas and 22nd in suburban areas. It can be largely attributed to the higher emphasis placed on energy-efficient technologies, which reflected in **EA1**. This is due to the fact that occupants tend to prefer energy efficiency because it offers immediate and clear benefits like lower energy use and reduced costs (Saleh and Hassan, 2024). However, renewable energy systems often required high upfront costs and took longer to provide financial returns (Hassan et al., 2023). Consequently, in rural areas, energy efficiency and renewable energy adoption rates were often low due to residents prioritising affordability and accessibility in building materials and technologies (Streimikiene *et al*., 2021). Additionally, lower income levels in rural communities made the initial investment in renewable energy less attractive,

despite potential long-term savings (Xu *et al*., 2024). The result contrasted with findings by Sun, Sun and Yue (2024), who reported that urban areas usually exhibited higher levels of renewable energy adoption compared to rural areas.

4.7.3 Comparison of Mean Rankings for ESG Practice Adoption Across Different Property Ages

The mean ranking of the adoption of incorporating ESG practices from the perspective of property age, including old, new, and mid-aged properties, is showcasted in Table 4.9. The properties with the highest mean scores are considered to have the most significant influence on the adoption of ESG practices.

Specifically, respondents living in properties less than 10 years old were classified under “New Property,” those in properties aged 10 to 15 years as “Mid-Aged Property,” and those in properties older than 16 years as “Old Property.” Moreover, this classification follows the Central Limit Theorem (CLT), which requires each sample group to have at least 30 respondents to ensure the sample distribution closely approximates the population’s normal distribution.

Table 4.9: Overall Mean Ranking of the Adoption of ESG Practices Across Different Property Age

Code	Adoption Level of ESG Practices	New Property		Mid-Aged Property		Old Property	
		Mean	Ranking	Mean	Ranking	Mean	Ranking
SA5	Install security system to safeguard the occupants	4.25	1	3.73	4	3.50	4
SA2	Adopt natural lighting system	3.89	2	4.03	1	3.57	3
GA2	Comply with regulations	3.86	3	3.54	11	3.63	2
EA1	Use of energy-efficient technology	3.84	4	3.78	3	3.27	8
SA1	Adopt ventilation system to ensure the indoor air quality	3.80	5	3.59	10	3.47	5
SA3	Optimise thermal comfort	3.74	6	3.46	12	3.77	1
EA8	Encourage public transport usage	3.70	7	3.86	2	3.43	7
SA4	Minimise noise disturbances	3.68	8	3.70	5	3.47	5
SA7	Practice inclusive design	3.64	9	3.70	5	2.9	12
GA4	Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably	3.62	10	3.70	5	2.73	14
SA8	Construct affordable housing	3.51	11	3.65	8	3.17	9
GA3	Establish effective channels for communication	3.46	12	3.65	8	3.10	10
GA5	Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability	3.46	12	3.41	13	2.90	12
EA2	Implement waste management practice	3.36	14	3.16	15	2.97	11
EA5	Practice biodiversity protection	3.25	15	3.35	14	2.73	14
EA4	Use of sustainable material	3.00	16	2.76	20	2.63	17

Table 4.9 (Continued)

Code	Adoption Level of ESG Practices	New Property		Mid-Aged Property		Old Property	
		Mean	Ranking	Mean	Ranking	Mean	Ranking
EA3	Practice water conservation	2.93	17	3.05	17	2.63	17
GA6	Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment	2.85	18	3.05	17	2.20	21
EA9	Adopt green lease	2.78	19	3.11	16	2.27	19
SA6	Organise social activities	2.58	20	2.43	21	2.7	16
EA7	Use of green rating tool	2.48	21	2.27	22	2.23	20
GA1	Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency	2.41	22	2.81	19	2.20	21
EA6	Use of renewable energy	2.27	23	1.89	23	2.17	23

Table 4.9 denotes old properties ranked 8th for **EA1** = “Use of energy efficiency,” which was lower than both new properties (rank = 4) and mid-aged properties (rank = 3). The differences in the rankings indicated that both mid-aged and new properties demonstrated a higher level of adoption of energy-efficient practices compared to old properties. Ramli *et al.* (2022) conducted a case study on residential buildings in the Klang Valley and found that older buildings tended to consume more energy, leading to increased operational energy usage. This was due to the degradation of building materials and systems over time, which reduced efficiency and required more energy to maintain comfort levels (Cunha and Aguiar, 2020). This finding aligns with Deshpande, Pagare and Tomar (2024), who observed that older buildings have higher energy consumption than new properties.

Moving on, new properties had a mean ranking of 4.25 for **SA5** = “Install of security system,” ranking 1st, which was higher than that of mid-aged properties (mean value = 3.73) ranked 4th and old properties (mean value = 3.50) ranked 4th. This indicates a new properties have higher adoption in install security system compared with mid-aged and old properties. Sharma (2024) found that new property are increasingly likely to feature integrated security systems is driven by technological advancements as well as a growing demand for comprehensive security solutions. This is consistent with Arun *et al.* (2024), who discovered that old and mid-aged properties often lack integrated security systems compared to new buildings due to factors like outdated construction designs and less emphasis on security features in the past.

Furthermore, old properties ranked 2nd for **GA2** = "Comply with regulations", followed by new properties (rank = 3) and mid-aged properties (rank = 11). This ranking can be explained by the higher adoption of **SA3** = "Optimising thermal comfort" in old properties, reflecting the challenges these buildings faced in maintaining consistent indoor temperatures. Iwuanyanwu *et al*. (2024) revealed that older buildings often had outdated materials, inefficient systems, and poor insulation, making them less thermally comfortable than newer buildings. Consequently, the need for upgrades to improve thermal performance and meet modern thermal comfort standards explained the high ranking for compliance with regulations in old properties, as they required

significant renovations. In contrast, new properties were typically built with the latest technologies and systems, making compliance with regulations less of a priority, as these buildings were already designed to meet current codes (Hafez *et al*., 2022). This aligns with the findings of Liao, Ren and Li (2023), who observed that building standards had improved over time, with new buildings generally adhering to the latest regulations.

The difference in rankings for **EA8** = "Encourage public transport usage" shows that mid-aged properties ranked it 2nd, while both new and old properties ranked it 7th. This is because occupants of old properties typically live in well-established neighborhoods where public transport infrastructure has been developed over time to meet growing commuting demands (Tiznado-Aitken, Yin and Farber, 2025; Zhou *et al*., 2022). Meanwhile, new properties are often strategically located near existing transit hubs to enhance their market value and attractiveness, leading occupants to perceive encouragement of public transport as less urgent. In contrast, mid-aged properties tend to be situated in areas where public transport systems are still developing or underutilised (Thilakshan *et al*., 2023). As a result, occupants of mid-aged properties place greater importance on encouraging public transport usage to improve accessibility and connectivity within their communities.

Moreover, the low rankings for **EA7** = "Use of green rating tool", where mid-aged properties ranking lowest at 22nd, with new and old properties at 21st and 20th respectively. Specifically, Ha, Khoo and Koo (2023) asserted that sustainable materials and technologies, such as those certified by the Green Building Index (GBI), remain in the early stages of development and are not widespread or mature in Malaysia. Furthermore, Bassi and Moscatelli (2020) observed that occupants of mid-aged properties tend to be less familiar with or concerned about sustainability certifications and green building practices. Therefore, these findings correspond with Masyhur *et al*. (2024), who identified that green rating tools are consistently low-ranked among Malaysian properties due to high costs, limited knowledge, and low awareness.

On the other hand, the consistently low ranking of **EA6** = "Use of renewable energy" ranked 23rd across all property types. This can be attributed to the comparatively higher emphasis placed on **EA1** = "Use of energy-efficient

technology," where all property types ranked relatively high. Consequently, occupants tend to prefer immediate and tangible energy-saving solutions, such as LED lighting and smart thermostats, which directly reduce costs and enhance comfort (Papadakis and Katsaprakakis, 2023). Furthermore, renewable energy systems are often perceived as complex, less accessible, and less directly impactful on daily living, resulting in lower awareness and concern among occupants in Malaysia (Zakaria *et al*., 2019). Hence, this aligns with the findings of Naimoglu and Akal (2023), who discovered that the adoption of energy efficiency measures can reduce the use of renewable energy.

4.8 Mann-Whitney U Test

The Mann-Whitney U test was conducted to examine significant differences in ESG practices based on education level, marital status, and housing status. A p-value of 0.05 was used in this test to determine statistical significance.

4.8.1 The Importance of Incorporating ESG Practices from a Building Occupant's Perspective.

A Mann-Whitney U test was applied to evaluate the importance of incorporating ESG practices from the building occupant's perspective in Section B of the questionnaire. The test revealed a significant difference across education levels for one (1) aspect of ESG practices, as shown in Table 4.10. Additionally, marital status was found to have five (5) significant differences, as presented in Table 4.12, while housing status showed six (6) significant differences, as indicated in Table 4.14.

4.8.1.1 Mann-Whitney U Test on Education Level

The respondents' educational levels, specifically "SPM," "STPM," "Diploma," "Advanced Diploma," and "Foundation," were categorised as "Educated," while those with educational qualifications of "Bachelor's Degree," "Master's Degree," and "PhD" were classified as "Highly Educated. This classification was made to fulfil the criteria of the Central Limit Theorem (CLT) where each group of the sample under investigation must have a sample size equal or greater than 30 to exhibit a normal distribution similar to the population. Hence, the

difference of respondent for the “Lower Educated” and “Educated” were investigated.

Two hypotheses are generated for this test as below:

Null hypothesis (H_0): There is no significant difference between the lower educated and educated building occupants on the importance of incorporating ESG practices.

Alternative hypothesis (H_1): There is a significant difference between the lower educated and educated building occupants on the importance of incorporating ESG practices.

Table 4.10: Mann-Whitney U Test on the Importance of Implementing ESG Practices across Education Level

Code	Importance of Implementing ESG Practices	Mann-Whitney U	Wilcox W	Asymp. Sig. (2- tailed)
P8	Able to obtain green financing	1641	4567	0.003

Table 4.10 presents the results of the Mann-Whitney U test, which examined the preferences of lower-educated and educated building occupants regarding the importance of incorporating ESG practices. The test revealed that only one (1) item, **P8** = "Able to obtain green financing," showed significant differences across education levels. The p-value for item P8 is less than 0.05, while the remaining items have p-values greater than 0.05. Consequently, the null hypothesis (H_0) is rejected for item P8.

Table 4.11: Mean-Rank on the Importance of Implementing ESG Practices across Education Level

Code	Importance of Implementing ESG Practices	Respondent	N	Mean Rank	Sum of Rank
P8	Able to obtain green financing	*Lower-Educated*	*76*	*60.09*	*4567*
		Educated	**60**	**79.15**	**4749**

Note: **Bold** indicates the highest mean rank

As depicted in Table 4.11, the mean rank for **P8** = "Able to obtain green financing" for lower-educated building occupants is 60.09, which is significantly lower than the mean rank of 79.15 for educated occupants. This result indicates that educated building occupants generally place a higher priority on the availability of green financing. Meng and Hao (2024) and Kassi and Li (2025) explained that individuals with higher levels of education tend to have a better understanding of green financing concepts, including the benefits, risks, and available options. This increased awareness is likely to result in a greater willingness to seek out and utilise green financing opportunities. Lee, Wang and Lee (2025) also emphasised that education is key to improving awareness and decision-making regarding green finance.

4.8.1.2 Mann-Whitney U Test on Marital Status

Two hypotheses are formulated as below:

Null hypothesis (H_0): There is no significant difference between the single and married building occupants on the importance of incorporating ESG practices.

Alternative hypothesis (H_1): There is a significant difference between the single and married building occupants on the importance of incorporating ESG practices.

Table 4.12: Mann-Whitney U Test on the Importance of Implementing ESG Practices across Marital Status.

Code	Importance of Implementing ESG Practices	Mann-Whitney U	Wilcoxon W	Rsymp. Sig. (2-tailed)
P3	Increase marketability and demand	1661	4901	0.005
P4	Increase property value	1799	5039	0.036
P6	Reduce tenant turnover	1700.5	4940.5	0.009
P9	Enhance transparency and trust	1655.5	4895.5	0.003
P18	Reduce cost	1809.5	5049.5	0.038

According to Table 4.12, five (5) ESG practices were found to have a p-value less than 0.05, indicating a significant difference between married and unmarried building occupants. The five practices are **P3** = "Increase marketability and demand," **P4** = "Increase property value," **P6** = "Reduce tenant turnover," **P9** = "Enhance transparency and trust," and **P18** = "Reduce cost." The results had indicated a significant difference in the importance of implementing ESG practices based on marital status. As a result, the null hypothesis (H_0) is rejected for these five practices.

Table 4.13: Mean-Rank on the Importance of Implementing ESG Practices across Marital Status

Code	Importance of Implementing ESG Practices	Marital Status	N	Mean Rank	Sum of Rank
P3	Increase marketability and demand	Single	80	61.26	4901
		Married	**56**	**78.84**	**4415**
P4	Increase property value	Single	80	62.99	5039
		Married	**56**	**76.38**	**4277**
P6	Reduce tenant turnover	Single	80	61.76	4940.5
		Married	**56**	**78.13**	**4375.5**
P9	Enhance transparency and trust	Single	80	61.19	4895.5
		Married	**56**	**78.94**	**4420.5**
P18	Reduce cost	Single	80	63.12	5049.5
		Married	**56**	**76.19**	**4266.5**

Note: **Bold** indicates the highest mean rank

Table 4.13 divulges that married individuals generally place higher importance on all five ESG practices than single individuals. This difference is particularly noticeable in practices such as increasing property value (**P4**), marketability and demand (**P3**), and reducing costs (**P18**), where the mean ranks for married individuals are significantly higher. The justification for this lies in married individuals often having more long-term financial responsibilities, such as supporting a family, managing a mortgage, or planning for their children's

education. As a result, they are likely to prioritise practices that contribute to long-term financial security, like increasing property value and reducing living costs. This finding aligns with Agunsoye *et al.* (2022), who discovered that married individuals typically focus more on long-term investments compared to single individuals.

Meanwhile, the married individuals rank ESG practices like reducing tenant turnover (**P6**) and enhancing transparency and trust (**P9**) much higher than single individuals. Browne *et al.* (2022) revealed that married individuals are generally more risk-averse than single individuals, largely due to their broader financial commitments and responsibilities. This stability is important as it minimises potential disruptions that can arise from high tenant turnover or lack of clear communication. Lim, Oh and Ngayo (2023) also advocated that married individuals prioritise stable living conditions to ensure a secure environment for their families. Consequently, they are more likely to value ESG practices that promote stability and reduce uncertainty in their living arrangements, such as reducing turnover and enhancing transparency.

4.8.1.3 Mann-Whitney U Test on Housing Status

Two hypotheses are formulated as below:

Null hypothesis (H_0): There is no significant difference between the tenants and building owners on the importance of incorporating ESG practices.

Alternative hypothesis (H_1): There is a significant difference between the tenants and building owner on the importance of incorporating ESG practices.

Table 4.14: Mann-Whitney U Test on the Importance of Implementing ESG Practices across Housing Status

Code	Importance of Implementing ESG Practices	Mann-Whitney U	Wilcox W	Rsymp. Sig. (2-tailed)
P2	Improve energy efficiency	2187	5928	0.037
P11	Minimise waste	2176	5917	0.030
P12	Provide affordable housing	1449.5	5190.5	<.001
P14	Improve safety and security	1910.5	5651.5	0.001

Table 4.14 (Continued)

Code	Importance of Implementing ESG Practices	Mann-Whitney U	Wilcox W	Rsymp. Sig. (2-tailed)
P15	Enhance water efficiency	2029.5	5770.5	0.004
P18	Reduce cost	1902	5643	0.001

As showcasted in Table 4.14, six (6) ESG practices were found to have a p-value less than 0.05, indicating a significant difference between building owners and tenants in their views on the importance of implementing ESG practices. The six practices are **P2** = "Improve energy efficiency", **P11** = "Minimise waste", **P12** = "Provide affordable housing", **P14** = "Improve safety and security", **P15** = "Enhance water efficiency", and **P18** = "Reduce cost". These results suggest that the importance placed on these ESG practices differs significantly between building owners and tenants. Consequently, the null hypothesis (H_0) is rejected for these six practices.

Table 4.15: Mean-Rank on the Importance of Implementing ESG Practices across Housing Status

Code	Importance of Implementing ESG Practices	Respondents	N	Mean Rank	Sum of Rank
P2	Improve energy efficiency	Owner	86	68.93	5928
		Tenant	**62**	**82.23**	**5098**
P11	Minimise waste	Owner	86	68.8	5917
		Tenant	**62**	**82.4**	**5109**
P12	Provide affordable housing	Owner	86	60.35	5190.5
		Tenant	**62**	**94.12**	**5835.5**
P14	Improve safety and security	Owner	86	65.72	5651.5
		Tenant	**62**	**86.69**	**5374.5**
P15	Enhance water efficiency	Owner	86	67.1	5770.5
		Tenant	**62**	**84.77**	**5255.5**

Table 4.15 (Continued)

Code	Importance of Implementing ESG Practices	Respondents	N	Mean Rank	Sum of Rank
P18	Reduce cost	Owner	86	65.62	5643
		Tenant	**62**	**86.82**	**5383**

Note: **Bold** indicates the highest mean rank

Table 4.15 reveals that tenants consistently rank ESG practices higher than owners across all the categories, which can be attributed to the direct impact these practices have on tenants' daily living conditions and costs. Brown *et al*. (2020) revealed that tenants place greater emphasis on cost reduction, as it directly affects their financial well-being and day-to-day living conditions. Reutter (2025) further explained that owners have limited financial incentives to undertake energy efficiency retrofits, as the associated cost savings primarily benefit tenants rather than owners themselves. Consequently, tenants have a stronger motivation to reduce costs and prioritise sustainable practices. Similarly, Chelli and Himick (2024) emphasised that tenants are primarily concerned with managing monthly expenses, which further explains their higher prioritisation of ESG practices such as energy efficiency (**P2**), waste minimisation (**P11**), water efficiency (**P15**), and cost reduction (**P18**), as these practices directly influence their utility bills and overall cost of living.

Besides that, affordable housing (**P12**) emerges as the highest-ranked practice by tenants, which underscores their concern for affordability. Anuar and Wahab (2022) revealed that tenants were more sensitive to housing costs, as tenants did not benefit from long-term financial mechanisms like mortgages or property appreciation. As a result, affordable housing initiatives can help provide stable and accessible rental options, supporting tenants' financial stability. Meanwhile, safety and security (**P14**) is highly ranked by tenants compared to owner. This is because tenants are more directly affected by the quality of the property and are more likely to prioritise their own safety and well-being. Consequently, this aligns with Liow (2024), who emphasised that safety and security are highly valued by tenants.

4.8.2 The Criteria of Incorporating ESG Practices from Building Occupant's Perspective

Mann Whitney U test was applied to identify the significant difference across housing status, geographical area, and education level towards the criteria of incorporating ESG practices in Section C of questionnaire. A p-value of 0.05 is adopted in this test.

4.8.2.1 Mann-Whitney U Test on Housing Status

Two hypotheses are formulated as below:

Null hypothesis (H_0): There is no significant difference between the tenants and building owners on the criteria of incorporating ESG practices.

Alternative hypothesis (H_1): There is a significant difference between the tenants and building owner on the criteria of incorporating ESG practices.

Table 4.16: Mann-Whitney U Test on the Criteria of Incorporating ESG Practices across Housing Status

Code	Criteria of Incorporating ESG Practice	Mann-Whitney U	Wilcox W	Rsymp. Sig. (2-tailed)
E1	Use of energy-efficient technology	2092	5833	0.014
E2	Implement waste management practice	2062.5	5803.5	0.009
E3	Practice water conservation	1939	5680	0.002
S1	Adopt ventilation system to ensure the indoor air quality	2083.5	5824.5	0.013
S3	Optimise thermal comfort	2119	5860	0.02
S5	Install security system to safeguard the occupants	2023.5	5764.5	0.006
S7	Practice inclusive design	2110	5851	0.019
S8	Construct affordable housing	2136	5877	0.026

Table 4.16 (Continued)

Code	Criteria of Incorporating ESG Practice	Mann-Whitney U	Wilcox W	Rsymp. Sig. (2-tailed)
G1	Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency	2178.5	5919.5	0.045
G2	Comply with regulations	2014.5	5755.5	0.007
G3	Establish effective channels for communication	1906.5	5647.5	0.002
G4	Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably	2021.5	5762.5	0.006
G5	Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability	2151	5892	0.03

As showcasted in Table 4.16, 13 ESG practices were found to have a p-value less than 0.05, indicating a significant difference between building owners and tenants in their views on the criteria of incorporating ESG practices. The criteria with a significant difference are **E1** = "Use of energy-efficient technology," **E2** = "Implement waste management practice," **E3** = "Practice water conservation," **S1** = "Adopt ventilation system to ensure indoor air quality," **S3** = "Optimise thermal comfort," **S5** = "Install security system to safeguard the occupants," **S7** = "Practice inclusive design," **S8** = "Construct affordable housing," **G1** = "Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency," **G2** = "Comply with regulations," **G3** = "Establish effective channels for communication," **G4** = "Implement robust anti-discrimination policies and practices to ensure all occupants are treated equitably," and **G5** = "Establish clear performance metrics

and regular reports for tenants on building performance to ensure accountability".

Table 4.17: Mean-Rank on the Criteria of Incorporating ESG Practices across Housing Status

Code	Criteria of Incorporating ESG Practice	Respondent	N	Mean Rank	Sum of Rank
E1	Use of energy-efficient technology	Owner	86	67.83	5833
		Tenant	**62**	**83.76**	**5193**
E2	Implement waste management practice	Owner	86	67.48	5803.5
		Tenant	**62**	**84.23**	**5222.5**
E3	Practice water conservation	Owner	86	66.05	5680
		Tenant	**62**	**86.23**	**5346**
S1	Adopt ventilation system to ensure the indoor air quality	Owner	86	67.73	5824.5
		Tenant	**62**	**83.9**	**5201.5**
S3	Optimise thermal comfort	Owner	86	68.14	5860
		Tenant	**62**	**83.32**	**5166**
S5	Install security system to safeguard the occupants	Owner	86	67.03	5764.5
		Tenant	**62**	**84.86**	**5261.5**
S7	Practice inclusive design	Owner	86	68.03	5851
		Tenant	**62**	**83.47**	**5175**
S8	Construct affordable housing	Owner	86	68.34	5877
		Tenant	**62**	**83.05**	**5149**
G1	Adopt GRI or SASB to ensure transparency	Owner	86	68.83	5919.5
		Tenant	**62**	**82.36**	**5106.5**
G2	Comply with regulations	Owner	86	66.92	5755.5
		Tenant	**62**	**85.01**	**5270.5**
G3	Establish effective channels for communication	Owner	86	65.67	5647.5
		Tenant	**62**	**86.75**	**5378.5**

Table 4.17 (Continued)

Code	Criteria of Incorporating ESG Practice	Respondent	N	Mean Rank	Sum of Rank
G4	Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably	Owner	86	67.01	5762.5
		Tenant	**62**	**84.9**	**5263.5**
G5	Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability	Owner	86	68.51	5892
		Tenant	**62**	**82.81**	**5134**

Note: **Bold** indicates the highest mean rank

Table 4.17 divulges that tenants consistently rank ESG practices higher than building owners. In terms of environmental, tenants place greater importance on energy-efficient technology (**E1**), waste management (**E2**), and water conservation (**E3**), all of which directly affect their utility costs and environmental footprint. As tenants often bear the cost of utilities, their interest in energy-efficient measures and water-saving practices is driven by a desire to lower their monthly bills. This is in line with the findings of Mjornell, Platten, and Bjorklund (2022), who concluded that tenants are more likely to prioritise environmental sustainability measures that directly impact their living costs. However, Baker *et al*. (2023) presents a contrasting perspective, arguing that, despite the potential co-benefits for improved living conditions, environmental sustainability tends to be ranked low in the hierarchy of tenants' perceived needs.

In terms of social pillar, tenants ranked adopt ventilation system (**S1**), optimise thermal comfort (**S3**), safety and security systems (**S5**), inclusive design (**S7**), and affordable housing (**S8**) higher than owners. These practices significantly impact tenants' quality of life, as they are directly influenced by their safety and the inclusivity of their living environment (Bozic, 2023). In addition, Salaam (2023) found that tenants are more likely to prioritise security

measures, such as alarm systems, and are more willing to pay for amenities like well-maintained grounds. This is further supported by Simpeh *et al.* (2024), which found that security is the most important criterion for tenants in a building, as it directly affects their quality of life. Similarly, affordable housing is particularly crucial for tenants, especially given their sensitivity to housing costs, which aligns with the findings of Anuar and Wahab (2022), who demonstrated that tenants are highly concerned with the affordability of their property.

Meanwhile, from a governance pillar, tenants highly value compliance with regulations (**G2**) and effective communication channels (**G3**). Tenants often prioritise strong governance practices as these structures help ensure their rights are protected and concerns are addressed promptly, impacting their overall rental experience. These findings aligns with Salazar (2024), which asserted that tenants prioritise transparent pricing that reflects current market conditions, as it fosters a sense of respect and fairness. Moreover, Salazar (2024) further explained that effective communication with tenants is essential in addressing their concerns and understanding their preferences, thereby contributing to a positive rental experience.

4.8.2.2 Mann-Whitney U Test on Geographical Area

Two hypotheses are formulated as below:

Null hypothesis (H_0): There is no significant difference between the urban and suburban on the criteria of incorporating ESG practices.

Alternative hypothesis (H_1): There is a significant difference between the urban and suburban on the criteria of incorporating ESG practices.

Table 4.18: Mann-Whitney U Test on the Criteria of Incorporating ESG Practices Across Geographic Areas

Code	ESG Criteria	Mann-Whitney U	Wilcoxon W	Rsymp. Sig. (2-tailed)
E3	Practice water conservation	1473.5	2214.5	0.02
E6	Use of renewable energy	1528	2269	0.044
E7	Use of green rating tool	1524.5	2265.5	0.048
E9	Adopt green lease	1449.5	2190.5	0.018

Table 4.18 (Continued)

Code	ESG Criteria	Mann-Whitney U	Wilcoxon W	Rsymp. Sig. (2-tailed)
S4	Minimise noise disturbances	1516	2257	0.031
S6	Organise social activities	1414	2155	0.012
G3	Establish effective channels for communication	1421	2162	0.012
G6	Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment	1460	2201	0.016

Table 4.18 manifests several criteria for incorporating ESG practices were found to have a p-value less than 0.05, indicating a significant difference in the views of building occupants regarding these practices across urban and suburban areas. The significant criteria include **E3** = "Practice water conservation", **E6** = "Use of renewable energy", **E7** = "Use of green rating tool", **E9** = "Adopt green lease", **S4** = "Minimise noise disturbances", **S6** = "Organise social activities", **G3** = "Establish effective channels for communication", and **G6** = "Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment". Consequently, the null hypothesis (H_0) is rejected for these criteria.

Table 4.19: Mean-Rank on the Criteria of Incorporating ESG Practices across Geographic Areas

Code	ESG Practice	Residential	N	Mean Rank	Sum of Rank
E3	Practice water conservation	**Urban**	**101**	**74.41**	**7515.5**
		Suburban	38	58.28	2214.5
E6	Use of renewable energy	**Urban**	**101**	**73.87**	**7461**
		Suburban	38	59.71	2269
E7	Use of green rating tool	**Urban**	**101**	**73.91**	**7464.5**
		Suburban	38	59.62	2265.5

Table 4.19 (Continued)

Code	ESG Practice	Residential	N	Mean Rank	Sum of Rank
E9	Adopt green lease	**Urban**	**101**	**74.65**	**7539.5**
		Suburban	38	57.64	2190.5
S4	Minimise noise disturbances	**Urban**	**101**	**73.99**	**7473**
		Suburban	38	59.39	2257
S6	Organise social activities	**Urban**	**101**	**75**	**7575**
		Suburban	38	56.71	2155
G3	Establish effective channels for communication	**Urban**	**101**	**74.93**	**7568**
		Suburban	38	56.89	2162
G6	Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment	**Urban**	**101**	**74.54**	**7529**
		Suburban	38	57.92	2201

Note: **Bold** indicates the highest mean rank

Table 4.19 divulges the differences in the rankings of ESG practices between urban and suburban residential areas. In terms of environmental practices, urban occupants ranked water conservation (**E3**), renewable energy use (**E6**), use of green rating tools (**E7**), and adopt green lease (**E9**) significantly higher than suburban occupants. These findings were consistent with Hafez *et al*. (2023), which indicated that urban occupants prioritised water conservation, renewable energy use, and the adoption of green rating tools more than their suburban areas. This was likely due to a combination of factors, including higher population density in urban areas, which led to greater awareness of resource scarcity, and the increased availability of green technologies and policies in urban environments. However, Adnan *et al.* (2017) presented contrasting findings, concluding that most respondents in Kuala Lumpur did not consider green lease practices significant for buildings.

From a social perspective, urban occupants ranked minimizing noise disturbances (**S4**) higher than suburban occupants. This was likely due to the

higher population density and potential noise pollution in urban areas, which led occupants to prioritize noise reduction to maintain their quality of life (Chen *et al*., 2024). Similarly, urban occupants also ranked organising social activities (**S6**) higher than suburban occupants. However, Clarke *et al*. (2023) found contrasting results, showing that suburban occupants emphasized the importance of connections with people within their community more frequently than those in urban areas. Additionally, Leh *et al*. (2020) observed that suburban communities made greater efforts to maintain good community interactions compared to urban communities. These findings suggest that urban occupants may be more individualistic and less focused on community interaction.

From a governance perspective, urban occupants rank effective communication channels (**G3**) and Corporate Social Responsibility (CSR) (**G6**) higher than suburban occupants. Adnan, Arif and Razali (2022) revealed that there was no significant difference between urban and suburban area from adopt corporate social responsibility to ensure fair tenant treatment in Malaysia. Additionally, Toukola and Ahola (2022) and Martinez-Avila and Olander (2024) found that urban properties tend to have more effective stakeholder engagement, leading to more efficient communication channels.

4.8.2.3 Mann-Whitney U Test on Education Level

Two hypotheses are formulated as below:

Null hypothesis (H_0): There is no significant difference between the education level on the criteria of incorporating ESG practices.

Alternative hypothesis (H_1): There is a significant difference between the education level on the criteria of incorporating ESG practices.

Table 4.20: Mann-Whitney U Test on the Criteria of Incorporating ESG Practices across Education Level

Code	Criteria of Incorporating ESG Practice	Mann-Whitney U	Wilcox on W	Rsymp. Sig. (2-tailed)
E7	Use of green rating tool	1721	4647	0.009

Table 4.20 presents the results of the Mann-Whitney U test, which examined the preferences of lower-educated and educated building occupants regarding the importance of incorporating ESG practices. The test revealed that only one (1) practice, **P8** = "Use of green rating tool," showed significant differences across education levels. The p-value for this practice is less than 0.05, while the remaining practices have p-values greater than 0.05. Therefore, the null hypothesis (H_0) is rejected for P8.

Table 4.21: Mean-Rank on the Criteria of Incorporating ESG Practices across Education Level

Code	Criteria of Incorporating ESG Practice	Educational	N	Mean Rank	Sum of Rank
E7	Use of green rating tool	*Lower-Educated*	*76*	*61.14*	*4647*
		Educated	**60**	**77.82**	**4669**

Note: **Bold** indicates the highest mean rank

As depicted in Table 4.21, the mean rank for "Use of green rating tool" for educated building occupants is 77.82, which is higher than the mean rank of 61.14 for lower-educated occupants. This result indicates that educated building occupants generally place a higher priority on the availability of green rating tool. Meng and Hao (2024) and Kassi and Li (2025) explained that individuals with higher levels of education tend to have a better understanding of green ratings concepts, including the benefits, risks, and available options. This increased awareness is likely to result in a greater willingness to seek out and utilise green rating tools opportunities. Lee, Wang, and Lee (2025) also further emphasised that education is key to improving awareness and decision-making regarding green practices.

4.8.3 The Adoption Level of ESG Practices from Building Occupant's Perspective

A Mann-Whitney U test was conducted to evaluate the adoption level of ESG practices from the building occupant's perspective. The results revealed significant differences across geographical areas, with urban and suburban areas

showing differing adoption rates for five (5) ESG practices, as detailed in Table 4.22. Additionally, education level was found to influence the adoption of ESG practices, with significant differences observed between lower and higher education groups for two ESG practices, as shown in Table 4.25. A p-value of 0.05 was applied for this analysis.

4.8.3.1 Mann-Whitney U Test on Geographic Area

Two hypotheses are formulated as below:

Null hypothesis (H_0): There is no significant difference between the urban and suburban on the adoption of ESG practices.

Alternative hypothesis (H_1): There is a significant difference between the urban and suburban on the adoption of ESG practices.

Table 4.22: Mann-Whitney U Test on the Adoption of ESG Practices in Existing Residences Across Geographic Areas

Code	Adoption Level of ESG Practices	Mann-Whitney U	Wilcox W	Rsymp. Sig. (2-tailed)
EA4	Use of sustainable material	1509.5	2250.5	0.047
EA8	Encourage public transport usage	1457.5	2198.5	0.023
SA2	Adopt natural lighting system	1482.5	2223.5	0.027
SA4	Minimise noise disturbances	1309.5	2050.5	0.003
SA7	Practice inclusive design	1439.5	2180.5	0.019

As demonstrated in Table 4.22, the results of the Mann-Whitney U test revealed significant differences in the adoption level of ESG practices between urban and sururban. The test showed that several practices exhibited significant differences across these two groups. These practices include **EA4** = "Use of sustainable material," **EA8** = "Encourage public transport usage," **SA2** = "Adopt natural lighting system," **SA4** = "Minimise noise disturbances," and **SA7** = "Practice inclusive design." Therefore, the null hypothesis (H_0) is rejected for these items.

Table 4.23: Mean-Rank on the Adoption of ESG Practices in Existing Residences Across Geographic Areas

Code	Adoption Level of ESG Practices	Residential	N	Mean Rank	Sum of Rank
EA4	Use of sustainable material	**Urban**	**101**	**74.05**	**7479.5**
		Suburban	38	59.22	2250.5
EA8	Encourage public transport usage	**Urban**	**101**	**74.57**	**7531.5**
		Suburban	38	57.86	2198.5
SA2	Adopt natural lighting system	**Urban**	**101**	**74.32**	**7506.5**
		Suburban	38	58.51	2223.5
SA4	Minimise noise disturbances	**Urban**	**101**	**76.03**	**7679.5**
		Suburban	38	53.96	2050.5
SA7	Practice inclusive design	**Urban**	**101**	**74.75**	**7549.5**
		Suburban	38	57.38	2180.5

Note: **Bold** indicates the highest mean rank

Table 4.23 divulges that the adoption of sustainable materials (**EA4**) in urban areas ranks higher (74.05) than in suburban areas (59.22). This difference can be attributed to the greater focus on sustainability in urban development, as urban areas often face more environmental pressures and resource constraints (Shamaee, Yousefi and Zahedi, 2024). Tehupeiory *et al*. (2023) further asserted that urban occupants are more aware of environmental issues and are more likely to demand sustainable features, such as green building materials. This is consistent with the findings of Perez-Sanchez, Fishman and Behrens (2024), who reported that suburban areas tend to use fewer low-emission building materials than urban areas.

Besides that, **EA8** = "Encourage public transport usage" ranks 74.57 in urban areas, significantly higher than 57.86 in suburban areas. The higher adoption of public transport in urban areas reflects the accessibility and availability of efficient public transit networks, such as buses and trains. Rahman *et al*. (2023) supported this by emphasizing that Kuala Lumpur benefits from an extensive public transportation network, which contributes to higher adoption rates in urban areas. Moreover, public transport can significantly reduce traffic congestion and travel times by encouraging a shift from private vehicles to public modes of transportation (Majid *et al.,* 2022). This finding was

further supported by Porru *et al*. (2020), who found that rural occupants had limited access to public transport services compared to those in urban areas.

The **SA2** = "Adoption of natural lighting systems" ranks 74.32 in urban areas, compared to 58.51 in suburban areas. These findings contradict the results of Volf *et al*. (2024), who suggested that urban areas generally experience reduced natural light compared to suburban areas due to factors such as dense building structures and light pollution. Furthermore, **SA4** = "Minimise noise disturbances" ranks 76.03 in urban areas, compared to 53.96 in suburban areas. This high adoption in urban areas can be explained by the fact that urban environments are often characterised by high noise levels due to traffic, construction, and dense populations (Chen *et al*., 2024). As a result, occupants in urban areas prioritise noise reduction measures to improve their quality of life. Moreover, the **SA7** = "Adoption of inclusive design" ranks 74.75 in urban areas, higher than 57.38 in suburban areas. This is due to the fact that urban areas generally demonstrate better inclusive design and accessibility features for people with disabilities compared to suburban areas (Zallio and Clarkson, 2021).

4.8.3.2 Mann-Whitney U Test on Education Level

Two hypotheses are formulated as below:

Null hypothesis (H_0): There is no significant difference between the education level on the adoption of ESG practices.

Alternative hypothesis (H_1): There is a significant difference between the education level on the adoption of ESG practices.

Table 4.24: Mann-Whitney U Test on the Adoption of ESG Practices in Existing Residences Across Education Level

Code	Adoption Level of ESG Practices	Mann-Whitney U	Wilcox W	Rsymp. Sig. (2-tailed)
EA2	Implement waste management practice	1706.5	4632.5	0.009
EA7	Use of green rating tool	1815	4741	0.033
SA1	Adopt ventilation system to ensure the indoor air quality	1808	4734	0.025
SA2	Adopt natural lighting system	1620.5	4546.5	0.002

Table 4.24 (Continued)

Code	Adoption Level of ESG Practices	Mann-Whitney U	Wilcox W	Rsymp. Sig. (2-tailed)
SA3	Optimise thermal comfort	1671	4597	0.005
GA4	Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably	1707.5	4633.5	0.009
GA5	Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability	1795.5	4721.5	0.028

Table 4.24 depicts the results of the Mann-Whitney U test based on the preferences of lower-educated and educated building occupants regarding the adoption of ESG practices. The test revealed several practices with significant differences across education levels. These practices include **EA2** = "Implement waste management practice," **EA7** = "Use of green rating tool," **SA1** = "Adopt ventilation system to ensure the indoor air quality," **SA2** = "Adopt natural lighting system," **SA3** = "Optimise thermal comfort," **GA4** = "Implement robust anti-discrimination policies and practices," and **GA5** = "Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability". As the p-values for these practices are all less than 0.05, the null hypothesis (H_0) is rejected for each of these items.

Table 4.25: Mean-Rank on the Adoption of ESG Practices in Existing Residences Across Education Level

Code	Adoption Level of ESG Practices	Education Level	N	Mean Rank	Sum of Rank
EA2	Implement waste management practice	Lower-educated	76	60.95	4632.5
		Educated	**60**	**78.06**	**4683.5**
EA7	Use of green rating tool	Lower-educated	76	62.38	4741
		Educated	**60**	**76.25**	**4575**

Table 4.25 (Continued)

Code	Adoption Level of ESG Practices	Education Level	N	Mean Rank	Sum of Rank
SA1	Adopt ventilation system to ensure the indoor air quality	Lower-educated	76	59.3	4506.5
		Educated	**60**	**80.16**	**4809.5**
SA2	Adopt natural lighting system	Lower-educated	76	59.82	4546.5
		Educated	**60**	**79.49**	**4769.5**
SA3	Optimise thermal comfort	Lower-educated	76	60.49	4597
		Educated	**60**	**78.65**	**4719**
GA4	Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably	Lower-educated	76	62.13	4721.5
		Educated	**60**	**76.58**	**4594.5**
GA5	Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability	Lower-educated	76	60.95	4632.5
		Educated	**60**	**78.06**	**4683.5**

Note: **Bold** indicates the highest mean rank

Referring to Table 4.25, it can be noticed that educated building occupants have higher mean rank in **EA2** = "Implement waste management practice" and **EA7** = "Use of green rating tool" compared to lower-educated occupants. Debrah, Vidal and Dinis (2021) observed that educated occupants place greater importance on waste management practices. This can be attributed to the fact that education often fosters a deeper understanding of environmental issues, including the impacts of improper waste management. Consequently, increased awareness motivates individuals to change their behavior, encouraging the adoption of sustainable waste management practices such as recycling and waste reduction (Etim, 2024). Similarly, Meng and Hao (2024) and Kassi and Li (2025) highlighted that individuals with higher education levels tend to possess a better grasp of green rating tool concepts, including its benefits, risks, and available options. This increased awareness is likely to result in a greater

willingness to adopt green rating tool. Lee, Wang, and Lee (2025) also emphasised that education is key to improving awareness and decision-making regarding green rating tool.

In term of social, **SA1** = "Adopt ventilation system to ensure the indoor air quality", **SA2** = "Adopt natural lighting system", and **SA3** = "Optimise thermal comfort" have a higher mean rank compared to lower-educated. Suarez-Perales *et al*. (2021) revealed that educated occupants are more likely to prioritise sustainable and comfortable living conditions as they understand the long-term benefits of energy efficiency and well-being. In contrast, occupants with lower levels of education might be less motivated to adopt sustainable practices and less aware of their environmental and health benefits (Bhutto *et al*., 2020).

4.9 Kruskal-Wallis Test

The Kruskal-Wallis Test was conducted to assess significant differences in the importance of incorporating ESG practices across various age groups and educational levels of building occupants. The determination of significant differences was based on the p-value of 0.05 and the degrees of freedom, which are calculated by subtracting 1 from the number of groups being analysed. In this study, three age groups and three educational levels were considered, resulting in a critical chi-square value of 5.991, corresponding to a degrees of freedom of 2.

4.9.1 The Importance of Incorporating ESG Practices from a Building Occupant's Perspective

A Kruskal-Wallis test was conducted to examine differences in the importance of incorporating ESG practices. The test found significant differences among the age groups, identifying two (2) ESG practices, as shown in Table 4.26. Additionally, income levels were found to have a significant difference in one (1) ESG practice, as detailed in Table 4.28.

4.9.1.1 Kruskal-Wallis Test on Age

Null hypothesis (H_0): There is no significant difference in the importance of incorporating ESG practices across age groups.

Alternative hypothesis (H_1): There is a significant difference in the importance of incorporating ESG practices across age groups.

Table 4.26: Kruskal-Wallis Test on the Importance of Implementing ESG Practices on Age

Code	Importance of Incorporating ESG Practice	Kruskal-Wallis H	df	Asymp.Sig.
P6	Increase property value	8.274	2	0.016
P18	Reduce cost	11.875	2	0.003

The results of the Kruskal-Wallis test on age levels are presented in Figure 4.26, where **P6** = "Increase property value" and **P18** = “Reduce cost” has a p-value less than 0.05 and an h-value greater than 5.991. This indicates a significant divergence in perspectives between the age groups of 21 to 30 years, 31 to 40 years, and 41 years and above regarding the importance of implementing ESG practices. Thus, the null hypothesis (H_0) for this driver is rejected.

Table 4.27: Mean Rank on the Importance of Implementing ESG Practices across Respondents’ Age Group

Code	Importance of Incorporating ESG Practice	Age Group	N	Mean Rank
P6	Increase property value	*21 years old to 30 years old*	*68*	*64.44*
		31 years old to 40 years old	37	80.85
		41 years old and above	**43**	**84.94**
P18	Reduce cost	*21 years old to 30 years old*	*68*	*63.29*
		31 years old to 40 years old	37	78.08
		41 years old and above	**43**	**89.14**

Note: **Bold** indicates the highest mean rank
Italic indicates the lowest mean rank

From Table 4.27, it can be observed that respondents in the age group of "41 years old and above" have higher mean rankings for all ESG practices that show significant differences. The results indicate that middle-aged building occupants place greater emphasis on property value appreciation and cost reduction compared to those under 31 years old. According to Wang *et al*. (2025), property value was particularly important for middle-aged occupants, as property served as a savings asset to support their retirement. In line with this, Aini, Aziz and Zulkifili (2017) highlighted that the majority of respondents aged 40 and above considered affordable living costs to be important, which aligned with the focus on cost reduction. Therefore, middle-aged occupants tend to prioritise properties that offer financial benefits in ESG practices.

4.9.1.2 Kruskal-Wallis Test on Income Level

Two hypotheses are generated for this test as below:

Null hypothesis (H_0): There is no significant difference across the income level of building occupants on the importance of incorporating ESG practices.

Alternative hypothesis (H_1): There is a significant difference across the income level of building occupants on the importance of incorporating ESG practices.

Table 4.28: Kruskal-Wallis Test on the Importance of Implementing ESG Practices across Income Group

Code	Importance of Incorporating ESG Practice	Kruskal-Wallis H	df	Asymp.Sig.
P12	Provide affordable housing	7.882	2	0.019
P17	Reduce social problem	7.089	2	0.029

Table 4.28 showcasted the results obtained from Kruskal-Wallis Test. It indicated that two important ESG practices have a p-value of less than 0.05 and H-values less than 5.991. These practices are **P12** = "Provide affordable housing" and **P17** = "Reduce social problems." Therefore, the null hypothesis (H_0) is rejected for these two ESG practices.

Table 4.29: Mean Rank on the Importance of Implementing ESG Practices across Income Group

Code	Importance of Incorporating ESG Practice	Income Group	N	Mean Rank
P12	Provide affordable housing	**RM 5,249 and below (B40)**	**37**	**88.69**
		RM 5,250 to RM 11,819 (M40)	72	73.24
		RM 11,820 and above (T20)	*39*	*63.37*
P17	Reduce social problem	**RM 5,249 and below (B40)**	**37**	**83.07**
		RM 5,250 to RM 11,819 (M40)	*72*	*65.81*
		RM 11,820 and above (T20)	39	82.41

Note: **Bold** indicates the highest mean rank
Italic indicates the lowest mean rank

Table 4.29 divulges that building occupants in the B40 group consistently showed a higher mean ranking in **P12** = "Provide affordable housing" and **P17** = "Reduce social problem" when compared to the M40 and T20 group. Tan (2021) argued that the T20 income group was less concerned with owning or purchasing affordable housing due to their higher incomes, which allowed them to afford more expensive properties, making affordable housing a lower priority for them. In contrast, the M40 and T20 groups were more focused on house prices, while the B40 group was more concerned with their financial and economic conditions (Zulkifli and Ismail, 2023). Subramaniam *et al.* (2024) further asserted that B40 occupants, with their lower monthly incomes, placed greater importance on securing affordable housing to improve their living standards. Additionally, the B40 group faced significant social challenges, including poverty, inequality, and other systemic issues affecting their communities (Basri *et al*., 2024). These challenges included low income, limited access to essential services such as education and healthcare. As a result, the B40 group placed a higher value on affordable housing to directly improve their quality of life and address the issues they faced.

4.9.2 The Criteria of Incorporating ESG Practices from Building Occupant's Perspective

A Kruskal-Wallis test was conducted to examine the differences in the criteria for incorporating ESG practices. The analysis revealed significant differences in the perceptions of the three age groups, with Table 4.30 illustrating four (4) key criteria across these groups. Furthermore, the test identified one (1) specific ESG practice within these criteria that was significantly influenced by the three income levels, as presented in Table 4.32.

4.9.2.1 Kruskal-Wallis Test on Age

Two hypotheses are generated for this test as below:

Null hypothesis (H_0): There is no significant difference across the age of building occupants on the criteria of implementing ESG practices.

Alternative hypothesis (H_1): There is a significant difference across the age of building occupants on the criteria of implementing ESG practices.

Table 4.30: Kruskal-Wallis Test on the Criteria of Incorporating ESG Practices across Respondents' Age Group

Code	Criteria of Implementing ESG Practice	Kruskal-Wallis H	df	Asymp .Sig.
E1	Use of energy-efficient technology	8.671	2	0.013
S5	Install security system to safeguard the occupants	8.384	2	0.015
G2	Comply with regulations	7.446	2	0.024
G3	Establish effective channels for communication	6.073	2	0.048

Table 4.30 shown the results obtained from Kruskal-Wallis Test. It indicated that four ESG criteria have a p-value of less than 0.05 and H-values less than 5.991. These practices are **E1** = "Use of energy-efficient technology", **S5** = "Install security system to safeguard the occupants", **G2** = "Comply with

regulations", and **G3** = "Establish effective channels for communication". Therefore, the null hypothesis (H_0) is rejected for these four ESG criteria.

Table 4.31: Mean Rank on the Criteria of Incorporating ESG Practices across Respondents' Age Group

Code	Criteria of Implementing ESG Practice	Age Group	N	Mean Rank
E1	Use of energy-efficient technology	*21 years old to 30 years old*	*68*	*64.77*
		31 years old to 40 years old	37	78.38
		41 years old and above	**43**	**86.55**
S5	Install security system to safeguard the occupants	*21 years old to 30 years old*	*68*	*67.41*
		31 years old to 40 years old	37	70.72
		41 years old and above	**43**	**88.97**
G2	Comply with regulations	*21 years old to 30 years old*	*68*	*68.65*
		31 years old to 40 years old	37	68.86
		41 years old and above	**43**	**88.59**
G3	Establish effective channels for communication	21 years old to 30 years old	68	75.05
		31 years old to 40 years old	*37*	*62.08*
		41 years old and above	**43**	**84.31**

Note: **Bold** indicates the highest mean rank
Italic indicates the lowest mean rank

According to Table 4.31, occupants in the 41 years old and above group ranked **E1** = "Use of energy-efficient technology" highest compared to other age groups. This highlighted that older occupants generally prioritize energy-saving features in their property, as they can reduce energy bills, improve comfort, and offer potential health benefits (Yagita and Iwafune, 2021). Additionally, the **S5** = "installation of security systems to safeguard occupants" was also ranked highest by the 41 years old and above group, reflecting their greater emphasis on safety and security. Vrancic, Zadravec and Orehovacki (2024) advocated that older individuals are likely more concerned about the safety of their property, leading them to prioritise security systems.

Furthermore, the 41 years old and above group ranked **G2** = "Comply with regulations" and **G3** = "Establish effective channels for communication"

highest compared to other age groups. Brooks *et al.* (2017) found that older occupants are often more focused on ensuring their properties meet all legal requirements because of the potential impact on the longevity and value of their investments. Additionally, older occupants often prioritise clear and effective communication channels (Jack, Ridley and Turner, 2019).

4.9.2.2 Kruskal-Wallis Test on Income Level

Two hypotheses are generated for this test as below:

Null hypothesis (H_0): There is no significant difference across the income group on the criteria of implementing ESG practices.

Alternative hypothesis (H_1): There is a significant difference across the income group on the criteria of implementing ESG practices.

Table 4.32: Kruskal-Wallis Test on the Criteria of Incorporating ESG Practices across Income Group

Code	Criteria of Implementing ESG Practice	Kruskal-Wallis H	df	Asymp.Sig.
E8	Encourage public transport usage	6.745	2	0.034

Table 4.32 shown the results obtained from Kruskal-Wallis Test. It showed that four ESG criteria have a p-value of less than 0.05 and H-values less than 5.991. The practices is E8 = "Encourage public transport usage". Therefore, the null hypothesis (H_0) is rejected for this one ESG criteria.

Table 4.33: Mean Rank on the Criteria of Incorporating ESG Practices across Income Group

Code	Criteria of Implementing ESG Practice	Income Group	N	Mean Rank
E8	Encourage public transport usage	**RM 5,249 and below (B40)**	**37**	**88.78**
		RM 5,250 to RM 11,819 (M40)	72	71.38
		RM 11,820 and above (T20)	*39*	*66.72*

Note: **Bold** indicates the highest mean rank
Italic indicates the lowest mean rank

Table 4.33 demonstrates that individuals in the B40 income group ranked "Encourage public transport usage" (**E8**) the highest (88.78), followed by the M40 group (RM 5,250 to RM 11,819) with a rank of 71.38, and the T20 group (RM 11,820 and above) at 66.72. This indicated that the B40 group placed significantly more importance on public transport due to financial constraints and the practical need for affordable and accessible transportation. Rosli, Samat and Bakar (2023) discovered that public transportation is the most viable and economical option for individuals in the B40 group, as they often lack the financial resources to own and maintain a private vehicle. In contrast, the M40 and T20 groups, with higher disposable incomes, were less dependent on public transport, as they had the financial capability to own and use private vehicles (Atan and Rahman, 2022).

4.9.3 The Adoption Level of ESG Practices from Building Occupant's Perspective

A Kruskal-Wallis test was conducted to examine differences in the adoption levels of ESG practices across age groups. Table 4.34 showed that 11 ESG practices exhibited significant differences among the three age groups of respondents.

4.9.3.1 Kruskal-Wallis Test on Age

Two hypotheses are generated for this test as below:

Null hypothesis (H_0): There is no significant difference across the age of building occupants on the adoption of ESG practices.

Alternative hypothesis (H_1): There is a significant difference across the age of building occupants on the adoption of ESG practices.

Table 4.34: Kruskal-Wallis Test on the Adoption of ESG Practices in Existing Residences Across Respondents' Age Group

Code	Adoption Level	Kruskal-Wallis H	df	Asym p.Sig.
EA1	Use of energy-efficient technology	23.759	2	<.001
EA5	Practice biodiversity protection	7.293	2	0.026

Table 4.34 (Continued)

Code	Adoption Level	Kruskal-Wallis H	df	Asym p.Sig.
EA6	Use of renewable energy	14.835	2	<.001
EA8	Encourage public transport usage	6.87	2	0.032
SA1	Adopt ventilation system to ensure the indoor air quality	12.407	2	0.002
SA2	Adopt natural lighting system	9.134	2	0.01
SA3	Optimise thermal comfort	17.345	2	<.001
SA5	Install security system to safeguard the occupants	13.987	2	<.001
SA6	Organise social activities	8.419	2	0.015
SA7	Practice inclusive design	11.441	2	0.003
SA8	Construct affordable housing	7.671	2	0.022

Table 4.34 presents the results from the Kruskal-Wallis Test for various ESG practices. The analysis indicates that several practices show significant differences in adoption levels. Specifically, **EA1** = "Use of energy-efficient technology," **EA5** = "Practice biodiversity protection," **EA6** = "Use of renewable energy," **EA8** = "Encourage public transport usage," **SA1** = "Adopt ventilation system to ensure the indoor air quality," **SA2** = "Adopt natural lighting system," **SA3** = "Optimise thermal comfort," **SA5** = "Install security system to safeguard the occupants," **SA6** = "Organise social activities," **SA7** = "Practice inclusive design," and **SA8** = "Construct affordable housing" all have p-values of less than 0.05, indicating significant differences in their adoption levels. Therefore, the null hypothesis (H_0) is rejected for all these ESG practices.

Table 4.35: Mean Rank on the Adoption of ESG Practices in Existing Residences Across Respondents' Age Group

Code	Adoption Level	Age Group	N	Mean Rank
EA1	Use of energy-efficient technology	*21 years old to 30 years old*	*68*	*57.81*
		31 years old to 40 years old	**37**	**95.18**
		41 years old to and above	43	83.1

Table 4.35 (Continued)

Code	Adoption Level	Age Group	N	Mean Rank
EA5	Practice biodiversity protection	*21 years old to 30 years old*	*68*	*69.49*
		31 years old to 40 years old	**37**	**90.58**
		41 years old and above	43	68.59
EA6	Use of renewable energy	**21 years old to 30 years old**	**68**	**88.4**
		31 years old to 40 years old	37	64.05
		41 years old and above	*43*	*61.5*
EA8	Encourage public transport usage	21 years old to 30 years old	68	71.07
		31 years old to 40 years old	**37**	**89.55**
		41 years old and above	*43*	*66.98*
SA1	Adopt ventilation system to ensure the indoor air quality	*21 years old to 30 years old*	*68*	*61.99*
		31 years old to 40 years old	**37**	**86.00**
		41 years old and above	43	84.38
SA2	Adopt natural lighting system	*21 years old to 30 years old*	*68*	*64.79*
		31 years old to 40 years old	**37**	**89.19**
		41 years old and above	43	77.21
SA3	Optimise thermal comfort	*21 years old to 30 years old*	*68*	*59.88*
		31 years old to 40 years old	**37**	**91.31**
		41 years old and above	43	83.15
SA5	Install security system to safeguard the occupants	*21 years old to 30 years old*	*68*	*62.82*
		31 years old to 40 years old	**37**	**93.46**
		41 years old and above	43	76.65
SA6	Organise social activities	**21 years old to 30 years old**	**68**	**84.57**
		31 years old to 40 years old	*37*	*60.76*
		41 years old and above	43	70.4
SA7	Practice inclusive design	21 years old to 30 years old	68	68.07
		31 years old to 40 years old	**37**	**94.42**
		41 years old and above	*43*	*67.53*

Table 4.35 (Continued)

Code	Adoption Level	Age Group	N	Mean Rank
SA8	Construct affordable housing	*21 years old to 30 years old*	*68*	*66.86*
		31 years old to 40 years old	**37**	**90.09**
		41 years old and above	43	73.16

Note: **Bold** indicates the highest mean rank
Italic indicates the lowest mean rank

Table 4.35 highlighted significant differences in environmental practices across age groups. The Millennial group (31-40 years old) ranks highest in adopting energy-efficient technologies (**EA1**), biodiversity protection (**EA5**), and public transport (**EA8**), demonstrating a strong commitment to sustainability. The results further revealed by Acunto, Filieri and Okumus (2025) that this age group placed more emphasis on environmental aspects compared to Gen Z (21-30 years old), suggesting a deeper engagement with sustainability. Additionally, Wijaya and Kokchang (2023) discovered that Gen Z had a higher propensity for renewable energy adoption (**EA6**). In contrast, Gen X (41 years old and above) showed the lowest adoption rates, particularly in renewable energy use and encouraging public transport usage. This lower engagement may be influenced by established infrastructure and lifestyle preferences that are less focused on adopting newer, more sustainable practices (Aiswarya, Harindranath and Challapalli, 2024). This is consistent with Nichols and Holt (2023), which found that older age groups, including Gen X, have lower sustainability attitudes compared to Millennials and Gen Z.

In terms of organizing social activities (**SA6**), Gen Z (21-30 years old) showed the highest engagement, reflecting a greater interest in community-building and social interaction compared to older age groups. However, this contrasted with the findings of Nurfadlilawati and Kusuma (2024), who discovered that Gen Z was less interested in social interaction than previous generations. Additionally, Hoof *et al*. (2017) found that Gen X was more health-conscious than younger people, with a greater focus on factors such as lighting, thermal comfort, and overall well-being. This trend extended to their living environments, where Gen X preferred spaces that prioritized comfort and well-being.

4.10 Spearman's Correlation Test

In this section, Spearman's Correlation test is adopted to examine one relationships which are the relationship between the importance of the incorporating ESG practices and the criteria of incorporating ESG practice; and the relationship between the criteria of incorporating ESG practices and the adoption level of ESG practices.

4.10.1 Importance of Incorporating ESG Practices and the Criteria for Incorporating ESG Practices from the Perspective of Building Occupants.

Table 4.37 presents the correlations between the importance and criteria of incorporating ESG practices. A total of 728 correlations were identified, with each of the 18 importance factors having at least 12 significant correlations with the influential criteria, while each of the 23 criteria has at least 11 significant correlations with the influential importance factors.

There are six (6) most significant importance with 23 significant correlations, which are "Improve energy efficiency" **(P2)**, "Increase marketability and demand**" (P3),** "Increase property value" **(P4)**, "Enhance transparency and trust" **(P9)**, "Minimise waste" **(P11)**, and "Enhance water efficiency" **(P15)**. Among these, "Enhance water efficiency" (P15), "Enhance transparency and trust" (P9), and "Increase property value" (P4) is a significant importance factor no matter in relationship between criteria of incorporating ESG practices and the importance of incorporating ESG practices.

This implies enhance water efficiency plays a crucial role in both environmental sustainability and cost reduction, benefiting tenants with lower utility bills and building owners with reduced operational costs (Okwandu *et al*., 2024). Furthermore, transparency and trust are key to positive owner and tenant relationships, leading to higher tenant retention, increased satisfaction, and ultimately, better financial stability for the property (Liu *et al*., 2024). Additionally, increasing property value directly impacts owners by enhancing capital appreciation and rental income, while tenants also benefit from better-maintained living spaces (Scherrenberg, Wessels and Nelisse, 2024).

Meanwhile, the most substantial criteria are “Practice water conservation” **(E3)** and “Practice inclusive design” **(S7),** with 18 significant correlations. This is in line with the study of Sunny (2024), who accentuated that the water conservation focuses on technical solutions to reduce water usage, such as installing low-flow fixtures, implementing efficient irrigation systems, and promoting water recycling. These actions are not only crucial for environmental sustainability but also for optimizing resource management and reducing operational costs (Randall and Koech, 2019). Similarly, inclusive design ensures spaces are accessible to all individuals, regardless of physical abilities. It involves specific design features such as ramps, wider doorways, and adaptable spaces to ensure that people with mobility, visual, or hearing impairments could navigate urban environments with ease (Bozic, 2023).

The highest correlation is “Enhance water efficiency” **(P15)** and “Practice water conservation” **(E3)**, with the ρ-value of 0.545. This correlation reveals that enhancing water efficiency focuses on using water more effectively, often through technological innovations, behavioral changes, and better management practices (Lakhiar *et al*., 2024). For instance, the implementation of water-efficient fixtures, rainwater harvesting, and greywater recycling systems significantly reduce water use (Obushnyi and Novikov, 2024). In contrast, practicing water conservation involves reducing total water consumption by adopting strategies such as limiting usage, protecting water sources, and promoting mindful consumption (Kumar and Thakur, 2024). As a result, prioritising water efficiency not only reduces consumption but also encourages individuals to adopt water-saving behaviors (Esmaeilishirazifard *et al*., 2024). Ultimately, these practices support long-term water sustainability and ensure future access to clean water (Zhang, 2023).

The result also demonstrated that there are two subsequent high correlations, with the ρ-value of 0.489. The “Use of renewable energy” (**E6**) is significantly correlated with “Enhance transparency and trust” (**P9**). The adoption of renewable energy sources, such as solar panels and other green technologies, is a clear indication of a commitment to sustainability, which in turn builds trust between building owners and occupants (Voland, Saad and Eicker, 2022). As a key criterion within ESG practices, the integration of

renewable energy not only contributes to reducing environmental impact but also directly benefits occupants by lowering energy costs and creating a more sustainable living environment (Khalufi *et al*., 2025). Furthermore, transparency regarding the integration of renewable energy technologies strengthens this trust by promoting accountability and openness in the building's operations (Waykar and Yambal, 2025). This transparent communication ensures that occupants are well-informed about the building's sustainable practices, which enhances their satisfaction and reinforces a sense of shared responsibility.

The third highest correlations is the "Enhance water efficiency" (**P15**) and "Comply with regulations" (**G2**), with the ρ-value of 0.476. Lakhiar *et al*. (2024) asserted that enhancing water efficiency helps reduce overall water consumption, which in turn lowers utility costs for occupants. However, the continuous evolution of environmental regulations has introduced uncertainty, as new standards and policies are constantly emerging (Zhu *et al*., 2021). For instance, a proposed law is being drafted by the National Water Services Commission (SPAN) to make labelling and the use of water-efficient devices mandatory in Malaysia (Carvalho, 2019). In response, enhancing water efficiency through ESG practices can mitigate the risks associated with future regulatory changes (Yebenes, 2024). This is because water efficiency typically involves adopting measures like installing water-efficient fixtures, implementing leak detection systems, and promoting water conservation behaviors among tenants (Obushnyi and Novikov, 2024). As a result, it not only reduce water consumption but also ensure compliance with both current and upcoming regulations.

Table 4.37: Correlation between the Importance of Incorporating ESG Practices and the Criteria for Incorporating ESG Practices from the Perspective of Building Occupants.

Criteria \ Importance	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	Total Correlation
E1	.313**	.436**	.382**	.383**	-	.288**	.179*	.193*	.320**	.338**	.259**	.235**	.279**	.345**	.286**	.179*	.274**	.319**	**17**
E2	.343**	.397**	.349**	.254**	.343**	.353**	.169*	-	.338**	.306**	.422**	.376**	.282**	.374**	.452**	.312**	.294**	.346**	**17**
E3	.301**	.373**	.372**	.393**	.266**	.457**	.241**	.360**	.444**	.395**	.426**	.354**	.345**	.287**	.545**	.358**	.167*	.391**	**18**
E4	.294**	.282**	.297**	.297**	.219**	.228**	.216**	.296**	.330**	.178*	.293**	.241**	.203*	-	.280**	.260**	.273**	.295**	**17**
E5	-	.211*	.225**	.246**	.359**	.251**	.256**	.339**	.346**	.172*	.331**	-	.214**	-	.279**	.292**	.219**	-	**14**
E6	.212**	.353**	.369**	.283**	.295**	.304**	.342**	.342**	.489**	.310**	.292**	.256**	.172*	-	.351**	.368**	.233**	-	**16**
E7	.163*	.209*	.314**	.257**	.215**	.310**	.286**	.327**	.245**	.186*	.254**	-	.186*	.178*	.302**	.297**	-	-	**15**
E8	.244**	.190*	.206*	.266**	-	.247**	-	-	.347**	.227**	.184*	.266**	.218**	.274**	.233**	.236**	-	.280**	**14**
E9	.220**	.180*	.300**	.375**	.272**	.410**	.259**	.439**	.328**	.211**	.316**	.163*	-	-	.300**	.328**	.181*	-	**15**
S1	.340**	.313**	.290**	.330**	.166*	.257**	-	.239**	.265**	.232**	.294**	.305**	.295**	.328**	.417**	.244**	-	.304**	**16**
S2	.343**	.249**	.309**	.258**	.310**	.257**	-	-	.233**	.190*	.240**	.203*	.392**	.242**	.328**	.166*	.285**	.293**	**16**
S3	.233**	.352**	.354**	.282**	.223**	.361**	.242**	.274**	.267**	.203*	.239**	.281**	.375**	.326**	.372**	.176*	-	.388**	**17**
S4	.243**	.324**	.320**	.246**	.253**	.194*	.183*	.223**	.325**	-	.415**	.255**	.375**	-	.341**	.251**	-	.259**	**15**

Table 4.37 (Continued)

Criteria \ Importance	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	Total Correlation
S5	.415**	.397**	.311**	.322**	.169*	.311**	-	-	.298**	.387**	.293**	.395**	.309**	.417**	.329**	.181*	.168*	.468**	**16**
S6	.167*	.267**	.302**	.318**	.220**	.206*	-	.223**	.258**	.255**	.173*	.173*	.211*	-	.331**	.193*	.200*	-	**15**
S7	.337**	.317**	.436**	.403**	.327**	.287**	.182*	.301**	.458**	.266**	.334**	.377**	.328**	.268**	.459**	.371**	.224**	.354**	**18**
S8	.236**	.319**	.260**	.337**	-	-	-	-	.304**	-	.194*	.410**	.314**	.281**	.320**	.288**	-	.322**	**12**
G1	.238**	.297**	.374**	.302**	.265**	.344**	-	.247**	.299**	.347**	.280**	.269**	.323**	-	.319**	.381**	.296**	.285**	**16**
G2	.419**	.459**	.338**	.341**	.193*	.274**	-	.226**	.338**	.381**	.382**	.428**	.422**	.331**	.476**	-	.181*	.384**	**16**
G3	.347**	.350**	.330**	.261**	.181*	.319**	-	-	.293**	.345**	.274**	.358**	.343**	.312**	.405**	.197*	.290**	.305**	**16**
G4	.400**	.320**	.428**	.450**	.280**	.382**	-	.335**	.339**	.250**	.356**	.334**	.226**	.262**	.386**	.175*	.188*	.413**	**17**
G5	.182*	.273**	.381**	.325**	.225**	.310**	-	.221**	.383**	.302**	.218**	.232**	.298**	.167*	.442**	.291**	.180*	.223**	**17**
G6	-	.240**	.348**	.271**	.198*	-	-	.206*	.297**	.185*	.229**	.214**	.288**	-	.335**	.296**	.234**	.175*	**14**
Total Correlation	**21**	**23**	**23**	**23**	**20**	**21**	**11**	**17**	**23**	**21**	**23**	**21**	**22**	**15**	**23**	**22**	**17**	**18**	

Note.**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.10.2 Criteria for Incorporating ESG Practices and the Adoption Level of ESG Practices from the Building Occupants' Perspective.

Table 4.38 displays the correlations between the criteria and adoption level of ESG practices. A total of 386 correlations were identified, with each of the 23 criteria having at least 3 significant correlations with the influential criteria, while each of the 23 adoption also has at least 3 significant correlations with the influential adoption factors. However, "Organise social activities" (**SA6**) and "Use of sustainable material" (**EA4**) show no correlation, indicating a lack of relationship between these two factors in the context of ESG adoption and criteria.

Specifically, there are three (3) most significant criteria with 17 significant correlations, which are " Practice biodiversity protection" **(E5),** "Use of green rating tool" **(E7)** and "Adopt green lease" **(E9)**. The practicing biodiversity protection ensures that buildings contribute positively to local ecosystems by creating green spaces and minimising ecological disruption, enhancing both environmental and occupant well-being (Wooster *et al*., 2022). Meanwhile, the use of green rating tools, such as LEED provides a standardised framework for measuring and improving building performance in terms of energy efficiency, water conservation, and waste management, making it essential for buildings to remain competitive and meet growing sustainability expectations (Wen *et al*., 2020). Additionally, adopting green leases fosters collaboration between tenants and building owners, promoting shared responsibility for sustainability goals like energy efficiency and waste reduction, while ensuring long-term environmental benefits (Wong and Chan, 2024).

Conversely, "Adopt natural lighting" (**SA1**) and "Comply with regulations" (**GA2**) are the most significant adoption factor, which with 19 significant correlations. Mahdavinejad *et al*. (2024) asserted that natural lighting can reduce energy consumption, as it minimises reliance on artificial lighting, lowers electricity costs, and enhances the overall environmental performance of a building. Additionally, this practice not only improves occupant comfort and well-being but also supporting energy efficiency regulations (Rohde *et al*., 2020). As environmental standards tighten, buildings are increasingly expected

to incorporate ESG practices to comply with regulations (Kostrikin and Andreeva, 2023).

Furthermore, the highest correlation is "Use of green rating tool" (**E7**) and "Adopt corporate social responsibility to ensure fair tenant treatment" (**GA6**), with the ρ-value of 0.427. Liu *et al*. (2025) found that the integration of green rating tools, such as BREEAM, with Corporate Social Responsibility (CSR) principles, benefits both the environment and tenants by promoting sustainable practices and fostering positive relationships. Sapuan *et al*. (2022) further emphasised that green rating tools help optimise resource use, reduce emissions, and enhance occupant health and comfort. In line with this, green rating tools is used as a tool to achieve sustainability goals, and CSR practices can guide the implementation of these tools (Pacheco, Gonzalez and Castro, 2020).

The second highest correlation is "Practice biodiversity protection" (**E5**) and "Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably" (**GA4**), with the ρ-value of 0.408. Wooster *et al*. (2022) revealed that practicing biodiversity protection involves preserving local ecosystems, fostering green spaces, and ensuring the health of the environment, all of which are essential for the long-term sustainability of both the building and its surrounding area. Simultaneously, adopting robust anti-discrimination policies ensures that all building occupants are treated fairly and with respect, promoting inclusivity and equality (Diana, 2024). Consequently, prioritising biodiversity protection alone is not enough; it must be complemented by policies that guarantee equitable access to its benefits (Bressane, Loureiro and Almendra, 2024).

The third highest correlation is "Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably" (**G4**) and "Adopt natural ventilation system to ensure the indoor air quality" (**SA1**), with the ρ-value of 0.397. For instance, a building with poor IAQ due to inadequate natural ventilation might disproportionately affect certain groups who are more sensitive to air quality issues like individuals with allergies or respiratory problems (Mannan and Al-Ghamdi, 2021). In line with this, implementing policies could help ensure that these groups are not unfairly exposed to poor

IAQ, as well as ensuring equitable treatment for all occupants (Shiddique *et al*., 2025). Together, these practices foster both a healthy, inclusive environment and a socially responsible, sustainable space that benefits tenants and society as a whole.

4.11 Summary of Chapter

A total of 218 sets of questionnaires were returned, and 70 sets were rejected because the respondents were not residing in high-rise residential buildings with 17 stories or more in Klang Valley. The data obtained were evaluated by adopting five (5) tests which are Cronbach's Alpha Reliability Test, Arithmetic Mean Test, Mann-Whitney U Test, Kruskal Wallis Test, and Spearman's Correlation Test.

The results indicated that building occupants highly prioritised improving safety and security in the importance of ESG practices, while building a positive reputation was less emphasised. In terms of criteria, installing security systems was prioritised, whereas organising social activities received less emphasis. Regarding adoption, installing security systems was highly prioritised, while the use of renewable energy was less prioritised. Additionally, comparisons were made between the importance and criteria of incorporating ESG practices by building owners and tenants, as well as the adoption of ESG practices based on property age and geographical area. Apart from that, the Mann-Whitney U Test demonstrated significant differences across marital status, education level, housing status and geographical area. On top of that, the Kruskal-Wallis Test revealed significant differences between income groups, property age, and respondents' age. Lastly, the Spearman's correlation test identified the most significant correlation between the importance of incorporating ESG practices and the criteria for incorporating ESG practices from the perspective of building occupants; and the relationship between the criteria of incorporating ESG practices and the adoption level of ESG practices.

Table 4.38: Correlation Between the Criteria for Incorporating ESG Practices and the Adoption Level of ESG Practices from the Building Occupants' Perspective.

Adoption \ Criteria	E1	E2	E3	E4	E5	E6	E7	E8	E9	S1	S2	S3	S4	S5	S6	S7	S8	G1	G2	G3	G4	G5	G6	Total Correlation
EA1	.259**	.304**	.259**	.254**	.386**	.291**	.269**	-.278**	.294**	.242**	.226**	-	.178*	.215**	.192*	.190*	-	.222**	.212**	-	.243**	-	.188*	**18**
EA2	-	-	-	-	.233**	.236**	-	.278**	.297**	-	-	-	-	-	.196*	-	-	-	-	-	-	-	-	**5**
EA3	-	-	-	-	.195*	.243**	-	-	.185*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**3**
EA4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0**
EA5	-	-	-	-	.228**	-	.168*	-	-	-	-	-	-	.172*	-	-	.201*	-	-	-	-	-	-	**4**
EA6	-	.185*	-	-	-	-	-	-	-	-	-	-	-	.215**	-	.2124**	.189*	-	-	-	-	-	-	**4**
EA7	.266**	.238**	.248**	-	-	-	.178*	-	-	-	-	-	-	.336**	-	.211*	.238**	-	.245**	.260**	-	-	-	**9**
EA8	-	-	-	-	-	-	.232**	.197*	.255**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**3**
EA9	.300**	-	-	-	.231**	-	.193*	-	.237**	-	-	.204*	-	.293**	-	-	.260**	-	.178*	.212**	-	-	-	**9**
SA1	.224**	.346**	.308**	.280**	.234**	.252**	.256**	.221**	.239**	.280**	.243**	.202*	.257**	-	-	.216**	-	-	.305**	.186*	.397**	.240**	.203*	**19**
SA2	-	.221**	.249**	-	.267**	.169*	.238**	-	.291**	.162*	.187*	-	.211*	-	.247**	.221**	-	-	-	-	.219**	-	-	**12**
SA3	-	.183*	.193*	.254**	.192*	.182*	.218**	-	.286**	.274**	.269**	.275**	-	-	.171*	.177*	-	-	.270**	-	.274**	-	.185*	**15**
SA4	-	-	-	-	.187*	.235**	.192*	-	.214**	-	-	-	-	-	-	-	-	-	-	-	-	.180*	.163*	**6**

Table 4.38 (Continued)

Adoption \ Criteria	E1	E2	E3	E4	E5	E6	E7	E8	E9	S1	S2	S3	S4	S5	S6	S7	S8	G1	G2	G3	G4	G5	G6	Total Correlation
SA5	.210*	.264**	.203*	-	-	.236**	.230**	.301**	.185*	.238**	.247**	.193*	.225**	.295**	-	.236**	-	-	.260**	.180*	.238**	-	-	**16**
SA6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0**
SA7	-	-	-	-	.279**	-	.249**	-	.231**	-	-	-	-	-	-	-	-	-	-	-	-	-	.200*	**4**
SA8	-	-	-	-	.295**	-	.298**	-	.355**	-	-	-	-	-	.192*	.174*	-	-	-	-	-	-	-	**5**
GA1	.243**	.168*	-	-	.201*	-	.312**	-	-	.227**	-	.276**	-	.322**	-	.201*	.322**	-	.285**	.237**	.193*	-	-	**12**
GA2	.275**	.185*	-	-	.260**	.252**	-	.219**	.237**	.355**	.331**	.189*	.218**	.177*	-	.204*	.167*	.229**	.305**	.202*	.234**	.271**	.298**	**19**
GA3	-	-	-	-	.340**	.214**	.255**	-	.281**	-	-	-	-	-	.230**	-	-	.166*	-	-	-	.268**	.261**	**8**
GA4	-	-	.226**	-	.408**	.204*	.331**	-	.296**	-	-	-	-	-	-	.194*	-	-	-	-	-	.179*	.178*	**8**
GA5	-	-	-	.189*	.336**	.203*	.352**	-	.295**	-	-	-	.183*	-	.240**	-	-	-	-	-	-	.197*	.296**	**9**
GA6	-	-	-	-	.384**	.221**	.427**	-	.263**	-	-	-	-	-	.176*	-	-	-	-	-	-	-	-	**5**
Total Correlation	**7**	**9**	**7**	**4**	**17**	**13**	**17**	**5**	**17**	**7**	**6**	**6**	**6**	**8**	**8**	**11**	**6**	**3**	**8**	**6**	**7**	**6**	**9**	

Note.**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter concluded the research by summarising the key accomplishments of the study. It outlined the achievement of the three objectives and discussed the contributions, limitations, and recommendations of the research. Finally, a brief summary of the chapter was provided, highlighting the main findings and insights derived from the study.

5.2 Accomplishment of Research Objective

The subsequent sections present a summary of the accomplishments of the three research objectives.

5.2.1 Objective 1: To Determine the Importance of Incorporating ESG Practices from Building Occupants' Perspective.

The first objective of this research was achieved by synthesizing the literature review and analyzing respondents' perspectives on the importance of ESG practices in high-rise residential buildings. A review of secondary sources identified 18 key ESG practices. Subsequently, questionnaires were distributed, and the data were analysed using various statistical tests, including the Arithmetic Mean, Mann-Whitney U test, Kruskal-Wallis test, and Spearman's Correlation test.

The Arithmetic Mean Test revealed that higher mean scores reflected the greater perceived importance of the ESG practices. Among the 18 ESG practices, the results showed that P14 = "Improve safety and security" ranked the highest, followed by P1 = "Enhance health and well-being." In contrast, P7 = "Able to obtain green financing" and P8 = "Build positive reputation" recorded the lowest importance levels. Furthermore, the comparison between building owners and tenants in terms of the importance of incorporating ESG practices revealed some differences. Both building owners and tenants ranked P1 = "Enhance health and well-being" and P14 = "Improve safety and security"

as their highest priorities. However, building owners ranked P8 = "Able to obtain green financing" as the lowest, while tenants ranked P7 = "Build positive reputation" as their lowest priority. This comparison underscores the differing views between owners and tenants on ESG priorities.

The results of the Mann-Whitney U test further revealed significant education-based differences, with educated occupants ranking P8 = "Able to obtain green financing" higher than their lower-educated counterparts. Additionally, married occupants ranked financial-ESG practices, such as P3 = "Increase marketability," P4 = "Increase property value," P6 = "Reduce tenant turnover," and P18 = "Reduce cost," higher than single occupants. This suggests that married individuals may place greater importance on long-term financial stability and value creation. Moreover, tenants placed a higher priority on several ESG practices, including P2 = "Improve energy efficiency," P11 = "Minimize waste," P12 = "Provide affordable housing," P14 = "Improve safety and security," P15 = "Enhance water efficiency," and P18 = "Reduce cost," compared to building owners. This highlights that tenants prioritiSe immediate improvements to their living environment, which directly impact their daily lives, while building owners may focus on other considerations such as financial returns and long-term sustainability.

The Kruskal-Wallis Test revealed two significant differences based on age groups, specifically 41 years old and above ranked for P6 = "Increase property value" and P18 = “Reduce cost” highly. These findings suggest that age may influence how occupants prioritize these factors, with different age groups likely placing varying levels of importance on property value and cost reduction. Furthermore, when comparing income levels, the B40 group ranked highly in P12 = “Provide affordable housing” and P17 = “Reduce social problems.” This highlights that individuals in the B40 income group prioritize affordability and social issues more significantly, reflecting their concerns about the financial and social implications of their living conditions.

On top of that, the Spearman’s Correlation Test identified six (6) most significant importance factors with 23 significant correlations, namely “Improve energy efficiency” (P2), “Increase marketability and demand” (P3), “Increase property value” (P4), “Enhance transparency and trust” (P9),

“Minimise waste” (P11), and “Enhance water efficiency” (P15). Meanwhile, “Enhance water efficiency” (P15), “Enhance transparency and trust” (P9), and “Increase property value” (P4) stand out as significant importance factors across various relationships between the criteria of incorporating ESG practices and the importance of incorporating ESG practices. The highest correlation observed was between “Enhance water efficiency” (P15) and “Practice water conservation” (E3), with a ρ-value of 0.545

5.2.2 Objective 2: To Examine the ESG Criteria from Building Occupants’ Perspective.

The Arithmetic Mean Test indicated that higher mean scores were associated with a greater perceived importance of the ESG criteria. Among the ESG practices, S5 = "Install security system to safeguard the occupants" emerged as the most highly prioritised, while S6 = "Organize social activities" received the lowest prioritisation. Furthermore, the comparison of ESG criteria between building owners and tenants was revealed. Both tenants and building owners prioritised S5 = "Install security system to safeguard the occupants." However, G1 = "Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency" was ranked the lowest by building owners, while tenants ranked S6 = "Organize social activities" as the lowest priority. This demonstrates the differences in priorities between tenants and owners, with tenants emphasising security, while owners focused less on transparency frameworks and more on building operations and occupant safety.

Besides that, the results of the Mann-Whitney U test revealed that tenants have prioritized 13 ESG criteria, including E1 = "Use of energy-efficient technology," E2 = "Implement waste management practice," E3 = "Practice water conservation," S1 = "Adopt ventilation system to ensure indoor air quality," S3 = "Optimize thermal comfort," S5 = "Install security system to safeguard the occupants," S7 = "Practice inclusive design," S8 = "Construct affordable housing," G1 = "Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency," G2 = "Comply with regulations," G3 = "Establish effective channels for communication," G4 = "Implement robust anti-discrimination policies and

practices to ensure all occupants are treated equitably," and G5 = "Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability." Additionally, ESG criteria such as E3 = "Practice water conservation," E6 = "Use of renewable energy," E7 = "Use of green rating tool," E9 = "Adopt green lease," S4 = "Minimize noise disturbances," S6 = "Organize social activities," G3 = "Establish effective channels for communication," and G6 = "Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment" were found to be prioritised more in urban areas than in suburban areas. Furthermore, the test revealed that educated occupants ranked P8 = "Able to obtain green financing" higher than their lower-educated counterparts, indicating a stronger emphasis on financial ESG practices among the educated group.

The Kruskal-Wallis Test revealed four significant differences based on age groups, with individuals aged 41 and above ranking E1 = "Use of energy-efficient technology," S5 = "Install security system to safeguard the occupants," G2 = "Comply with regulations," and G3 = "Establish effective channels for communication" highly. Additionally, for the income group, E8 = "Encourage public transport usage" was highly ranked by the B40 group, indicating that lower-income occupants place greater importance on sustainability practices that enhance their mobility and reduce transportation costs.

In terms of the Spearman's Correlation Test, the most significant criteria are "Practice water conservation" (E3) and "Practice inclusive design" (S7), which exhibited 18 significant correlations in the test exploring the relationship between the importance and criteria of incorporating ESG practices. Additionally, when examining the relationship between the criteria for incorporating ESG practices and the adoption level of these practices from the building occupants' perspective, the most significant criteria were identified as GA2 = "Comply with regulations" and SA1 = "Adopt ventilation system to ensure indoor air quality."

5.2.3 Objective 3: To Evaluate the ESG Practices from Building Occupants' Perspective.

The Arithmetic Mean Test indicated that higher mean scores corresponded to a greater perceived adoption of ESG practices. Among the various ESG practices, SA5 = "Install security system to safeguard the occupants" emerged as the most widely adopted, while EA6 = "Use of renewable energy" received the lowest adoption. Furthermore, the comparison of ESG practices adoption across urban, suburban, and rural areas revealed interesting trends. Both urban and suburban areas highly adopted SA5 = "Install security system to safeguard the occupants," whereas GA3 = "Establish effective channels for communications" was most highly adopted in rural areas. In contrast, EA6 = "Use of renewable energy" was the least adopted in both urban and rural areas, while EA7 = "Use of green rating tool" received the lowest adoption in suburban areas. Additionally, the comparison of ESG practices adoption across different property types revealed that new properties most highly adopted SA5 = "Install security system to safeguard the occupants," mid-aged properties prioritized SA2 = "Adopt natural lighting," and old properties highly adopted SA3 = "Optimize thermal comfort." However, all property types showed the lowest adoption of EA6 = "Use of renewable energy."

The Mann-Whitney U test revealed significant differences in the prioritization of ESG practices across urban, suburban, and educational groups. Specifically, urban areas prioritized practices such as EA4 = "Use of sustainable material," EA8 = "Encourage public transport usage," SA2 = "Adopt natural lighting system," SA4 = "Minimize noise disturbances," and SA7 = "Practice inclusive design." Additionally, the test highlighted significant differences in ESG practice adoption between lower-educated and educated occupants. Educated occupants tended to place more importance on practices such as EA2 = "Implement waste management practice," EA7 = "Use of green rating tool," SA1 = "Adopt ventilation system to ensure indoor air quality," SA2 = "Adopt natural lighting system," SA3 = "Optimize thermal comfort," GA4 = "Implement robust anti-discrimination policies," and GA5 = "Establish clear performance metrics and regular reports."

The Kruskal-Wallis Test revealed 11 significant differences based on age groups. Specifically, EA1 = "Use of energy-efficient technology," EA5 = "Practice biodiversity protection," EA8 = "Encourage public transport usage," SA1 = "Adopt ventilation system to ensure indoor air quality," SA2 = "Adopt natural lighting system," SA3 = "Optimise thermal comfort," SA5 = "Install security system to safeguard the occupants," SA7 = "Practice inclusive design," and SA8 = "Construct affordable housing" were all prioritized by occupants aged 31 to 40 years old. On the other hand, EA6 = "Use of renewable energy" and SA6 = "Organise social activities" were given more importance by those 21 years old to 30 years old.

The Spearman Correlation Test revealed three key adoption factors with 17 significant correlations, namely “Practice biodiversity protection” (E5), “Use of green rating tool” (E7), and “Adopt green lease” (E9). Among these ESG practices, the highest correlation was observed between “Use of green rating tool” (E7) and “Adopt corporate social responsibility to ensure fair tenant treatment” (GA6), with a ρ-value of 0.427. This indicates a strong relationship between the adoption of green rating tools and the implementation of CSR practices aimed at ensuring fair treatment for tenants.

5.3 Research Contributions

This study provides valuable insights into ESG practices in high-rise residential buildings, emphasising its importance, key criteria, and adoption levels from the perspective of building occupants. For the Malaysian government, this study supports agencies such as the Ministry of Local Government Development (KPKT) and the Construction Industry Development Board (CIDB) in refining regulations that promote sustainable property management. The findings align with the objectives of the National Construction Policy 2030, contributing to enhanced environmental sustainability, social well-being, and governance transparency in the built environment.

For the industry, the study provides developers, property managers, and investors with data-driven insights into ESG adoption trends and occupant preferences. This enables key stakeholders, including the Real Estate and Housing Developers’ Association (REHDA) and the Malaysian Institute of

Property and Facility Managers (MIPFM), to anticipate challenges, implement effective sustainability initiatives, and ensure compliance with regulatory requirements while enhancing property value and marketability. In academia, this study contributes to the growing body of knowledge on ESG practices in high-rise properties. Universities can incorporate its findings into their curricula to better equip future professionals, while researchers can utilise it as a foundation to further explore and refine ESG implementation in Malaysia.

By applying the Kruskal-Wallis and Mann-Whitney U tests, the study revealed significant differences in the perceived importance, criteria, and adoption levels of ESG practices across various socio-demographic groups. These findings provide a comprehensive understanding of how socio-demographic characteristics influence building occupants' perceptions of ESG practices. The insights gained from this study can further support developers in designing and promoting ESG initiatives that are more responsive to the distinct preferences and concerns of various occupant groups in high-rise residential buildings. Additionally, policymakers and organisations such as REHDA can leverage these findings to create targeted awareness campaigns, financial support schemes, and policy frameworks that encourage the adoption of ESG practices. Collectively, these contributions support the advancement of sustainable living as an accessible and equitable option for all building occupants in Malaysia.

5.4 Research Limitations

This study has several limitations that should be considered. First, the study adopts a quantitative research method using structured questionnaires may limit the depth of understanding of participants' views on ESG practices. By using closed-ended questions, respondents were restricted to predefined answer choices, which may not capture the full range of perspectives on ESG issues. As a result, some insights into ESG practices may not be fully captured, affecting the depth of the findings.

Second, the research is geographically limited to Klang Valley, which may affect the generalisability of the findings to other regions in Malaysia. Occupants in different states may have varying perspectives on ESG practices

due to differences in local policies, infrastructure, and environmental awareness. Additionally, respondents from Sabah and Sarawak were not included, which may lead to an incomplete representation of Malaysia's diverse population. The study also focuses solely on ESG practices in high-rise buildings, which limiting the applicability of the findings to other property types, such as low-rise or landed developments. Therefore, the results may not fully capture ESG practices in commercial or mixed-use developments.

Third, the use of online surveys distributed through social media and email platforms may have introduced some bias into the sample, as the respondents were primarily those who have access to the internet and are active on these platforms. This might have excluded certain demographic groups, such as older adults or individuals with limited access to technology, resulting in a sample that is not fully representative of the broader population. While this method provides broader reach and convenience, it also has limitations, such as the potential for respondents to misinterpret questions and the lack of direct interaction, which limited clarification opportunities. As a result, this may have affected the accuracy and reliability of the responses.

While this study provided valuable insights into the importance, criteria, and adoption levels of specific ESG practices in high-rise buildings, it did not fully evaluate the challenges related to their adoption. Although the research identified which practices were considered important and adopted by building occupants, it did not explore in depth the barriers and challenges that may have hindered their implementation. As a result, the study fell short in addressing the factors that affected the successful adoption of ESG practices in real-world contexts. This limitation restricted the overall contribution of the study by not accounting for the practical difficulties and obstacles that could have arisen during the implementation phase, thus limiting the broader applicability of the findings.

5.5 Research Recommendations

To overcome the limitations identified in this study, several recommendations are proposed for future research. First, adopting a mixed-methods approach that combines qualitative methods, such as interviews or focus group discussions,

with quantitative surveys would allow respondents to elaborate on their perspectives, providing richer insights into the factors influencing the adoption of ESG practices. This would provide a more in-depth understanding of ESG practices that may not be fully captured through structured questionnaires alone. Second, future research should expand its geographical coverage beyond Klang Valley to include respondents from other states, particularly Sabah and Sarawak. This would ensure a more comprehensive representation of diverse perspectives on ESG practices across Malaysia, considering differences in local policies, infrastructure, and environmental awareness.

Additionally, increasing the sample size would enhance the reliability and generalisability of the findings, ensuring a broader representation of building occupants' views on ESG implementation. Future studies should also refine survey distribution methods by incorporating both online and face-to-face approaches. This would allow researchers to clarify any ambiguous questions, reducing the risk of misinterpretation and improving the accuracy of responses. Another recommendation is to conduct a pilot test before distributing the final questionnaire. A pilot test would help identify potential issues with question clarity, structure, and response accuracy, which ensuring the survey is well-designed and effectively captures the intended data.

Lastly, future research could explore longitudinal studies to track changes in ESG awareness, adoption, and implementation over time. This approach would provide valuable insights into how ESG practices evolve in residential buildings and their long-term impact on sustainability. By following these recommendations, future studies can offer more comprehensive and reliable findings, enhancing the understanding of ESG practices in high-rise residential buildings. Additionally, future research should focus on examining the challenges and barriers to adopting ESG practices in high-rise buildings. This is because investigate the practical difficulties faced during implementation could provide a deeper understanding of the factors that influence the successful integration of these practices. While this study focused on high-rise buildings, future research should expand to include other property types, such as low-rise buildings, landed developments, and commercial properties. This would allow for the identification of differences in ESG

practices across various building types, offering a broader understanding of ESG adoption within the Malaysian property sector.

5.6 Summary of Chapter

This chapter provided a comprehensive overview of the research, including the background, research gap, aim, objectives, and key findings. It also highlighted the contributions made by the study to the field. Further, the limitations of the research were acknowledged, and suggestions for enhancing future studies were offered. These recommendations aimed to further refine the understanding and application of ESG practices, addressing potential areas for deeper exploration and improvement in future research.

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APPENDICES

Appendix A: Questionaire

Section A: Demographic Information

In this section, you are required to tick (✓) in the checkbox where appropriate.

Please note that the information will be kept anonymous.

1. Based on your current living arrangement, do you own or rent your residence?
    - Owner of the property (go to Q2)
    - Tenant (go to Q3)
    - Living with family (not renting or owning) (go to Q3)
    - Other, please specify _____ (go to end of question)

2. How do you use the property?
    - Live in the property (go to Q3)
    - Rent it out to tenants (go to Q4)
    - Live in and at the same time rent out to tenants (go to Q3 + Q4)

3. How long you have been residing at the property? (go to Q5)
    - Less than 1 year
    - 1-5 years
    - 6-10 years
    - 11-15 years
    - More than 16 years

4. How long you have been renting out the property? (go to Q5)
    - Less than 1 year
    - 1-5 years
    - 6-10 years
    - 11-15 years
    - More than 16 years

5. What is your property type?
    - Apartment/Condominium (go to Q6)
    - Landed properties (go to end of question)
    - Others, please specify _____ (go to end of question)

6. What is your gender?
    - Male
    - Female

7. What is your age group?
    - Below 21 years old
    - 21 years old to 30 years old
    - 31 years old to 40 years old
    - 41 years old to 50 years old
    - 51 years old and above

8. What is your ethnicity?
    - Malay
    - Chinese
    - Indian
    - Others, please specify _____

9. What is your current employment status?
    - Unemployed
    - Employed
    - Self-employed
    - Student
    - Retired
    - Others, please specify _____

10. What is your highest education level?
    - High School
    - Sijil Pelajaran Malaysia (SPM) / GCE O-Level / equivalent
    - Sijil Tinggi Persekolahan Malaysia (STPM) / GCE A-Level / equivalent
    - Foundation
    - Diploma
    - Bachelor's Degree
    - Master's Degree
    - PhD
    - Other, please specify _____

11. What is your monthly income level?
    - RM 5,249 and below (B40)
    - RM 5,250 to RM 11,819 (M40)
    - RM 11,820 and above (T20)

12. What is your marital status?
    - Single
    - Married
    - Divorced
    - Widowed

13. Do you have any children living with you?
    - Yes
    - No

14. Which area is your current residential property located?
    - Kuala Lumpur
    - Cheras
    - Petaling Jaya
    - Kajang
    - Puchong
    - Subang Jaya
    - Kepong
    - Shah Alam
    - Putrajaya
    - Dengkil
    - Sungai Buloh
    - Semenyih
    - Banting
    - Jenjarom
    - Rawang
    - Klang
    - Others, please specify _____

15. What is your current residential property's building height?
    - Low-rise (3 to 5 stories)
    - Medium-rise (6 to 16 stories)
    - High-rise (17 stories and above)

16. How old is your current residential property ?
    - Less than 5 years
    - 5 – 10 years
    - 11 – 15 years
    - 16 – 20 years
    - More than 21 years

17. What is the built-up size of your current residential property?
    - Below 500 sq ft
    - 500 to 800 sq ft
    - 801 to 1,100 sq ft
    - 1,101 to 1,400 sq ft
    - 1,401 to 1,700 sq ft
    - 1,701 to 2,000 sq ft
    - 2,001 to 2,300 sq ft
    - 2,301 to 2,600 sq ft
    - 2,601 sq ft and above

18. What is the total number of units in your current residential property? (e.g. 200 units)
    - Please specify _____

Section B: The Importance of Incorporating ESG Practices from a Building Occupant's Perspective.

This section contains a list of statements regarding the importance of incorporating ESG practices in high-rise residential properties. Rate the level of importance of implementing ESG practices.

Importance of Implementing ESG Practice	**Least Important 1**	**Less Important 2**	**Neutral 3**	**Important 4**	**Very Important 5**
Enhance health and well-being (e.g.: improve quality of life of human)					
Improve energy efficiency (e.g.: lower environmental footprint)					
Increase marketability and demand (e.g.: can lease or sell the property more quickly.)					

Increase property value (e.g.: more attractive from investor's point of view)					
Able to access to tax incentives					
Reduce tenant turnover (e.g.: tenants are more likely to renew their leases)					
Build positive reputation (e.g.: people will think that owners are not money-minded)					
Able to obtain green financing (e.g.: green mortgage offered by the banks)					
Enhance transparency and trust (e.g.: openly sharing					

detailed information about property transactions, including sales, leases, and etc.)					
Reduce risk (e.g.: lower regulatory risk, operational risk, and reputational risk)					
Minimise waste (e.g.: decrease the use of landfills and incineration)					
Provide affordable housing (e.g.: ensuring the low or middle-income household can access for housing)					
Increase legal protection (e.g.: ensuring the building					

complies with environmental regulations)					
Improve safety and security (e.g.: install CCTV, anti-theft system, security alarm, etc.)					
Enhance water efficiency (e.g.: decrease the use of freshwater)					
Preserve natural resource (e.g.: lower embodied carbon)					
Reduce social problem (e.g.: promote social diversity, equity, and inclusion					
Reduce cost (e.g.: lower operational costs make it more					

financially viable over building lifecycle)					

Section C: The Criteria of Incorporating ESG Practices from Building Occupant's Perspective.

This section contains a list of criteria related to ESG practices in high-rise residential properties. Rate the level of importance the criteria for implementing ESG practices in high-rise residential properties.

Criteria of ESG Practice	**Least Important 1**	**Less Important 2**	**Neutral 3**	**Important 4**	**Very Important 5**
<u>Part A: Environmental Aspect</u>					
Use of energy-efficient technology (e.g., installing LED lighting, HVAC system)					
Implement waste management practice (e.g., reducing single-use products,					

reusing materials, etc.)					
Practice water conservation (e.g., reuse of grey water from showers)					
Use of sustainable material (e.g., low Volatile Organic Compounds (VOC) paints)					
Practice biodiversity protection (e.g., rooftop planting, vertical greenery)					
Use of renewable energy (e.g., install rooftop solar photovoltaic)					
Use of green rating tool (e.g., obtain GBI or LEED certification)					
Practice public transport usage (e.g., ensuring housing is located near transportation					

services like MRT stations.)					
Adopt green lease (e.g., set clear sustainability commitments for both building owners and tenants)					
Part B: Social Aspect					
Adopt ventilation system to ensure the indoor air quality (e.g., install HVAC system)					
Adopt natural lighting system (e.g., exterior glazing, such as windows and skylights)					
Optimise thermal comfort (e.g., an appropriate temperature that is not too hot or too cold)					
Minimise noise disturbances					

(e.g., install sound insulation)					
Install security system to safeguard the occupants (e.g., CCTV, anti-theft system, security alarm, etc.)					
Organise social activities (e.g., host seasonal festivals) to reduce the loneliness and social isolation					
Practice inclusive design (e.g., provide tactile paving, ramps, elevators, etc) to improve physical accessibility.					
Construct affordable housing (e.g., provide energy efficient design, water conservation, etc) to reduce long-term costs					

Part C: Governance Aspect					
Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency.					
Comply with regulations (e.g.: waste management, air quality, etc) to reduce the risk of penalties or fines					
Establish effective channels for communication (e.g., feedback system or regular tenant meetings) to enhance stakeholder engagement.					
Implement robust anti-discrimination policies and practice to ensure					

all occupants are treated equitably.					
Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability.					
Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment.					

Section D: The Adoption Level of ESG Practices from Building Occupant's Perspective.

This section contains a list of statements related to the adoption level of ESG practices in high-rise residential properties. Rate the adoption level of the ESG practices in your current residential properties.

ESG Practice	Never Adopt 1	Seldom Adopt 2	Sometimes Adopt 3	Usually Adopt 4	Always Adopt 5
Part A: Environmental Aspect					

Use of energy-efficient technology (e.g., installing LED lighting, HVAC system)					
Implement waste management practice (e.g., reducing single-use products, reusing materials, etc.)					
Practice water conservation (e.g., reuse of grey water from showers)					
Use of sustainable material (e.g., low Volatile Organic Compounds (VOC) paints)					
Practice biodiversity protection (e.g., rooftop planting, vertical greenery)					
Use of renewable energy (e.g., install rooftop solar photovoltaic)					

Use of green rating tool (e.g., obtain GBI or LEED certification)					
Practice public transport usage (e.g., ensuring housing is located near transportation services like MRT stations.)					
Adopt green lease (e.g., set clear sustainability commitments for both building owners and tenants)					
Part B: Social Aspect					
Adopt ventilation system to ensure the indoor air quality (e.g., install HVAC system)					
Adopt natural lighting system (e.g., exterior glazing, such as					

windows and skylights)					
Optimise thermal comfort (e.g., an appropriate temperature that is not too hot or too cold)					
Minimise noise disturbances (e.g., install sound insulation)					
Install security system to safeguard the occupants (e.g., CCTV, anti-theft system, security alarm, etc.)					
Organise social activities (e.g., host seasonal festivals) to reduce the loneliness and social isolation					
Practice inclusive design (e.g., provide tactile paving, ramps, elevators, etc) to					

improve physical accessibility.					
Construct affordable housing (e.g., provide energy efficient design, water conservation, etc) to reduce long-term costs					
Part C: Governance Aspect					
Adopt Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) to ensure transparency.					
Comply with regulations (e.g.: waste management, air quality, etc) to reduce the risk of penalties or fines					
Establish effective channels for communication					

(e.g., feedback system or regular tenant meetings) to enhance stakeholder engagement.					
Implement robust anti-discrimination policies and practice to ensure all occupants are treated equitably.					
Establish clear performance metrics and regular reports for tenants on building performance to ensure accountability.					
Adopt Corporate Social Responsibility (CSR) to ensure fair tenant treatment.					

End of Questionnaire Survey

Thank you for participating in this survey.