ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) PRACTICES IN CONSTRUCTION SUPPLY CHAIN ORGANISATIONS: A COMPARISON OF ORGANISATIONAL PRACTICES AND COGNITIVE PERCEPTIONS OF INDUSTRIAL PRACTITIONERS

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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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May 2024

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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APPROVAL FOR SUBMISSION

I certify that this project report entitled **"ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) PRACTICES IN CONSTRUCTION SUPPLY CHAIN ORGANISATIONS: A COMPARISON OF ORGANISATIONAL PRACTICES AND COGNITIVE PERCEPTIONS OF INDUSTRIAL PRACTITIONERS"** was prepared by **CHONG ZHI LOONG** has met the required standard for submission in partial fulfilment of the requirements for the award of Bachelor of Science (Honours) Quantity Surveying at Universiti Tunku Abdul Rahman.

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ABSTRACT

The growing importance of Environmental, Social, and Governance (ESG) practices has led to their adoption across industries as a framework for sustainability, ethical operations, and responsible governance. In Malaysia, the Ministry of Investment, Trade, and Industry's (MITI) i-ESG framework aligns with the nation's development goals. The research gap addresses the limited studies on ESG practices in the Malaysian construction industry. Hence, this research investigates how Malaysian organisations within the construction supply chain leverage ESG practices to mitigate environmental, social, and governance risks while capitalising on potential opportunities. The research approach involves three key steps: (i) tracing the evolution of ESG from its roots in 1960s' Socially Responsible Investing (SRI) to current ESG considerations, (ii) analysing how organisations manage ESG-related practices, and (iii) identifying the cognitive perceptions of ESG practices of industrial practitioners to develop strategies for further improvement of the ESG practices implementations within the Malaysian construction supply chain. Data collection utilises a pilot-tested questionnaire designed to capture organisational ESG practices across the three ESG components. It found a gap between employee understanding of ESG and implemented practices, suggesting potential improvement through greater employee participation. This research analyses the results of a questionnaire that was completed by 211 respondents. Initially, the data underwent descriptive statistical analysis. For the more detailed study, inferential statistical tests such as the Friedman’s Test, Kruskal-Wallis H Test, and Wilcoxon signed-rank Test are employed to enable the drawing of more general conclusions while accounting for potential variations in the characteristics of the respondents. The research contributions highlight how ESG practices can impact the construction industry, governing bodies, and academic and research communities.

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LIST OF SYMBOLS / ABBREVIATIONS

ESG	Environmental, Social, and Governance
KLSE	Kuala Lumpur Stock Exchange
UN	United Nations
SRI	Socially Responsible Investing
PRI	Principles for Responsible Investment
UNDG	United Nations Development Group
SDG	Sustainable Development Goals
CLT	Central Limit Theorem
SPSS	Statistical Package for Social Sciences
LEED	Leadership in Energy and Environmental Design
BREEAM	Building Research Establishment Environmental Assessment Methodology

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CHAPTER 1

INTRODUCTION

1.1 General Introduction

The concept of Environmental, Social, and Governance (ESG) has gained significant traction as a crucial framework for evaluating sustainability, ethical practices, and responsible governance within various industries recently (Ravindran, 2023). The term ESG was popularly used first in a 2004 report titled "Who Cares Wins", which was a joint initiative of financial institutions at the invitation of UN (United Nations, 2004). More companies and investment funds are adopting programs or policies that are keyed to various ESG measures as they look to drive profitability and improve access to capital. Regulators across the globe are busy writing and implementing new disclosure regimes. Investors are pushing for information as they develop and refine ESG-based investing strategies (Holland and Malone, 2023). On 11 April 2023, the Malaysian government announced that it will introduce a framework on environmental, social, and corporate governance (ESG) standards by the end of 2023. The framework will aim to assist small and medium sized enterprises (SMEs) in relation to funding and capacity building, and to support the transition to renewable energy (Latham et al., 2023).

Being an integral component of the nation's development and progress, the construction sector is not an exception. The Malaysian construction industry, known for driving economic growth and infrastructure development, is acknowledging the need to incorporate ESG principles (Salleh, 2022).

Environmental considerations entail evaluating construction practices for their impact on the ecosystem, energy efficiency, waste management, and adherence to sustainable building standards (Ibrahim, 2023). The social dimension revolves around labour practices, worker safety, community engagement, and fostering diversity and inclusion throughout the industry (Ibrahim, 2023). Finally, governance aspects focus on transparency, accountability, and ethical decision-making within construction companies (Ibrahim, 2023).

As the construction industry navigates challenges such as climate change, urbanisation, and the ethical treatment of stakeholders, the integration of ESG principles becomes not only a moral imperative but also a strategic necessity (Yap, 2022). Investors, regulators, consumers, and the public at large are demanding greater transparency and responsible behaviour from businesses, and the construction industry is no exception (Yap, 2022).

1.2 Problem Statement

The following are some of the published researches found:

(1) Lokuwaduge and Heenetigala (2016), studied the extent of ESG reporting among companies in the metal and mining sector that are listed on the Australian Securities Exchange. Their study focus on the types of ESG indicators being utilised in the sector.

(2) G. Arian, Sands and Shams (2022) conducted statistical analyses with data from all publicly listed Australian companies from 2007 to 2017 to study the corporate ESG performance. The study considers the differing effects of ESG on financial performance in various industry sectors.

(3) According to Ionescu et al. (2019), the relationship between environmental, social, and governance (ESG) factors and the market value of companies operating in the travel and tourism industry were studied based on the market value of 73 publicly listed companies located in Europe, United States and Asia from 2010 to 2015.

(4) Xie's (2020) study on the selected energy and power utility companies found that the issue of disparities in ESG ratings companies among companies that are included in the Climate Action 100+ list and are publicly traded in the United States were seen across different ESG rating agencies.

(5) Another study by Chelawat and Trivedi (2016) in India found that the corporations are shifting their focus from short-term profit maximisation to long-term sustainability objectives that encompass environmental, social, and corporate governance (ESG) goals. The impact of ESG performance on financial outcomes can vary widely from one country to another due to differences rating adopted by different rating agencies and the regulatory requirement of the country resides.

The research highlighted indicates that there is limited study concerning ESG practices in the construction industry, particularly in Malaysia.

1.3 Research Aim

This research aims to fill the knowledge gap regarding ESG practices in the construction industry. It aims to examine the Environmental, Social and Governance (ESG) practices in construction supply chain organisations of Malaysian companies.

1.4 Research Objectives

To achieve the aforementioned aims, the following objectives have been established:

i. To explore the organisational practices of ESG.
ii. To examine the common practices related with ESG in the organisations of Malaysian construction supply chain.
iii. To identify the potentials strategies in the integration of ESG and practices of Malaysian construction supply chain.

1.5 Research Methodology

The published literature related to the evolutions and practices of ESG are reviewed. The current state of ESG practices in construction supply chain organisations are explored through reviewing of the annual reports of the construction companies listed in the Kuala Lumpur Stock Exchange (KLSE). Affinity diagrams are used to synthesis the contents of ESG practices. The affinity diagrams will be used to generate related questionnaire subsequently to collect the primary data from the industry on common practices on ‘What’ and “How’ the construction supply chain involved in ESG.

1.6 Research Scope

There is no specific restrictions or prerequisites for the respondents from the construction community. This research targets any individuals engaged in the construction supply chain and not limited in professions and years of experience.

1.7 Outline of the Report

The report structure is breakdown into five chapters: Introduction, Literature Review, Methodology, Result and Discussion, and Conclusion and Recommendations.

Chapter 1 provide a contextual explanation of ESG and justification on why this research is needed and then set the focus of the research aim in examination of the Environmental, Social and Governance (ESG) practices in construction supply chain of Malaysian companies. The three research objectives are to facilitate the accomplishment of the research aim. A brief account on the research methodology including primary data collection by questionnaire and define the scope of this research. Finally, it layouts the outline of the subsequent Chapters.

Chapter 2 serves as the literature review for the study, providing clear definitions of terms such as organisational practices, cognitive perceptions, and construction supply chain organisations. Furthermore, it offers an overview of past research on topics like Socially Responsible Investing (SRI), the Ten Principles of the United Nations Global Compact, Principles for Responsible Investment (PRI), United Nation Sustainable Development Goals (SDG), and Environmental, Social, and Governance (ESG). This review supports the research by establishing a theoretical foundation and contextual background, highlighting how these concepts and principles relate to the current study.

Chapter 3 presents the research methods on how the research was done with the data and information collected from the respondents and interpreting the design of the survey questionnaires. The research primarily adopts a quantitative approach methodology, utilising methods such as questionnaires and online surveys to gather feedback from the targeted respondents.

Chapter 4 presents and evaluates the results derived from the data collected in the study. This chapter discusses the research strategies, research approach, sampling methods, and data analysis techniques used. The reliability of the data is evaluated using a range of statistical methods, such as the Arithmetical Mean, Cronbach's Alpha Reliability Test, Friedman's Test, Shapiro-Wilk Test, Kruskal-Wallis H Test, and Wilcoxon Signed-Rank Test. Additionally, this chapter provides an explanation of the rationale behind the

questionnaire design, detailing how it was structured to effectively gather the necessary information for the study.

Chapter 5 concludes the summary of research. It summarises the completion of the research objectives and discussing the limitations and considerations of the research. The recommendation for future study regarding the research is given after evaluating the lessons learnt.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter begins by defining key terms such as organisational practices, cognitive perceptions and construction supply chain. It then reviews the evolution of Environmental, Social, and Governance (ESG) practices, exploring the three components of ESG in detail. The practices of ESG within the construction supply chain are examined thoroughly. Finally, the chapter analyses the ESG practices of Malaysian construction companies by reviewing the Annual Reports of companies listed on the Kuala Lumpur Stock Exchange (KLSE). This analysis helps to provide a comprehensive understanding of how ESG principles are integrated into the operational strategies of these companies.

2.2 Organisational Practices and Cognitive Perceptions

Organisational practices encompass the established methods, protocols, and procedures that define how a company operates daily (Aubouin-Bonnaventure et al., 2021). These practices are tangible actions and strategies that a company officially implements to achieve its objectives. They include a broad range of activities such as decision-making processes, compliance protocols, human resources management, and approaches to sustainability and corporate governance.

Ryte Magazine (2021) explained cognitive perceptions refer to the beliefs, attitudes, and understanding that employees and management hold regarding various aspects of their organisation's practices and culture. This cognitive aspect shapes how individuals perceive the importance, effectiveness, and value of the organisational practices in place. It influences their motivation, engagement, and ultimately, how well these practices are executed.

For instances, if a construction company has robust ESG policies as part of its organisational practices, the real impact of these policies can depend significantly on the cognitive perceptions of its employees. If employees believe in the importance of these ESG initiatives, they are more likely to implement these practices earnestly and effectively. Conversely, if there is a cognitive

disconnect where employees see these practices as mere formalities rather than essential actions, the effectiveness of these initiatives can be compromised. Therefore, the alignment between organisational practices and cognitive perceptions is critical. When employees' beliefs and understandings are in sync with the company's practices, it leads to higher job satisfaction, better compliance with policies, and more effective overall performance.

2.3 Construction Supply Chain Organisations

The construction production process is distinctly temporary, with specific organisations established temporarily to manage each project. Each project stands out as unique, underscoring the distinctive nature of construction work. For these projects to succeed, the roles played by construction supply chain organisations are crucial. Ive and Gruneberg (2000) explained the various roles and actors involved throughout the construction process. Teams of professionals, including architects, quantity surveyors, engineers, contractors, and site labourers, are often quickly assembled. Once a project concludes, these teams dissolve, and the individuals move on to other projects at new locations, typically working with different people and firms.

The construction supply chain itself is a complex network of diverse participants, each playing essential roles crucial for the successful completion of a project. Suppliers provide vital raw materials and components like cement, steel, or wood, which are foundational for building construction. These materials are then converted into specific construction products such as windows, doors, or plumbing fixtures by manufacturers, who work closely with suppliers to ensure these products are available when needed (Buildern, 2023). Logistics companies play a key role in managing the transportation and storage of these materials, ensuring they are efficiently delivered to the construction site on time (Buildern, 2023). Prime contractors lead the project, managing the entire supply chain from material sourcing to subcontractor coordination, maintaining the project's schedule and workflow (Buildern, 2023). Subcontractors perform specialised tasks such as electrical work or roofing and rely on the punctual delivery of necessary materials to perform their jobs effectively (Buildern, 2023). Furthermore, architects and engineers are crucial during the project's design and planning phases, working closely with prime

contractors to ensure that all materials required for their designs are specified, ordered, and delivered promptly (Buildern, 2023). This coordination ensures that the project's structural and aesthetic requirements are seamlessly met, contributing to the overall success of the construction endeavour.

2.4 Evolutions of Environmental, Social and Governance (ESG)

ESG, which stands for Environmental, Social, and Governance, encompasses the three pillars that aim to capture the non-financial risks and opportunities inherent in a company's operations. It shifts the focus beyond purely financial aspects, emphasising environmental sustainability, social responsibility, and strong governance practices (Deloitte, 2021). While it is challenging to attribute the first mention of ESG to a specific person or organisation, various stakeholders, including academics, researchers, investment professionals, and advocacy groups, have played a role in shaping and promoting the concept over time. The origin of ESG can be tracked back when socially responsible investing (SRI) began to gain traction (Townsend, 2020).

2.4.1 Socially Responsible Investing (SRI)

In 1960s and 1970s, investors started to incorporate considerations of SRI. They sought to align their investments with their values, often avoiding companies involved in controversial activities such as tobacco production, weapons manufacturing, or environmental degradation (Dalrymple, 2023).

Over the following decades, the concept of SRI expanded and evolved, incorporating broader considerations beyond just financial returns. In the 1990s and early 2000s, the term “sustainable investing” gained popularity, reflecting the notion of long-term viability and responsible business practices (Mike, 2019). During this time, various organisations, academic institutions, and asset managers began developing frameworks and methodologies to assess and integrate environmental, social, and governance factors into investment analysis.

ESG as a distinct acronym and concept started gaining performance around the late 2000s and early 2010s. It became a recognised term in the investment industry, used to describe a set of criteria for evaluating the sustainability and societal impact of companies (Townsend, 2020). ESG factors encompass a broad range of issues, including environmental performance,

labour practices, supply chain management, corporate governance structures, diversity and inclusion, and more (Townsend, 2020).

Today, ESG considerations have become increasingly mainstream in the investment community, with a growing recognition of the importance of sustainable and responsible business practices (Blume, 2021).

2.4.2 Ten Principles of the United Nation Global Compact

The ESG has been include in the ten principles of United Nation Global Compact since mid-2000s. The United Nations Global Compact (UN Global Compact) is a voluntary initiative launched by the United Nations in 2000 to encourage businesses and organisations worldwide to adopt sustainable and socially responsible policies and practices. It is the world's largest corporate sustainability initiative and aims to mobilise the private sector to take a more active role in addressing global challenges (United Nations Global Compact, 2023). The principles 1 to 6 can be mapped to the social components, while principles 7 to 9 are related to the environmental and principle 10 is concerned with governance of the ESG as indicated in the following Table 2.1.

Table 2.1: United Nation Global Compact and ESG

United Nation Global Compact	Description	Environmental, social and governance (ESG)
Principle 1	Businesses should support and respect the protection of internationally proclaimed human rights; and	Social
Principle 2	Make sure that they are not complicit in human right abuses	Social
Principle 3	Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;	Social

Principle 4	The elimination of all forms of forced and compulsory labour;	Social
Principle 5	The effective abolition of child labour; and	Social
Principle 6	The elimination of discrimination in respect of employment and occupation.	Social
Principle 7	Businesses should support a precautionary approach to environmental challenges;	Environmental
Principle 8	Undertake initiatives to promote greater environmental responsibility; and	Environmental
Principle 9	Encourage the development and diffusion of environmentally friendly technologies.	Environmental
Principle 10	Businesses should work against corruption in all its forms, including extortion and bribery.	Governance

2.4.3 Principles for Responsible Investment (PRI)

Subsequently, the integration of ESG factors into investment strategies, and encourage investors to consider the broader societal and environmental impacts of their investments was enhanced by the United Nations-backed initiative, the United Nations Principles for Responsible Investment (PRI) in 2006. The initiative was developed through a collaborative effort involving investment professionals, asset owners, and other stakeholders. The PRI aims to promote responsible investment practices, enhance the integration of ESG factors into investment strategies, and encourage investors to consider the broader societal and environmental impacts of their investments (Stein, 2023).

There are six core principles of the PRI that signatories commit to uphold. First of all, incorporating ESG issues into investment analysis and decision-making process. The first principle emphasises the integration of ESG

factors into investment practices. It encourages investors to consider environmental, social, and governance factors alongside traditional financial analysis to better understand the risks and opportunities associated with an investment (PRI, 2022).

Secondly, being active owners and incorporating ESG factors into ownership practices. According to PRI (2022), this principle highlights the importance of active ownership and engagement by investors. It encourages investors to exercise their rights as shareholders to influence the behaviour of companies and promote positive change. Engaging with companies on ESG issues can involve dialogue, proxy voting, and collaborative initiatives.

Besides, seeking appropriate disclosure on ESG issues from investee companies is also one of the principles. Transparency and disclosure are vital for responsible investment. This principle encourages investors to request relevant ESG information from companies and use it to inform their investment decisions. By seeking comprehensive and standardised ESG disclosures, investors can assess a company's sustainability performance more effectively (PRI, 2022).

Moreover, promoting the acceptance and implementation of the PRI within the investment industry. Investors are encouraged to advocate for responsible investment practices throughout the investment industry. This can include collaborating with peers, industry associations, and policymakers to promote the adoption and implementation of the PRI principles. Sharing knowledge and best practices can help drive positive change across the investment community (PRI, 2022).

Furthermore, working together to enhance effectiveness of implementation of PRI principles. According to PRI (2022), collaboration and cooperation are crucial for advancing responsible investment. This principle encourages investors to work together, both domestically and internationally, to share experiences, research, and expertise. By pooling resources and efforts, investors can collectively drive greater impact and influence positive change.

Lastly, reporting on activities and progress towards implementing the PRI principles. The final principle emphasises accountability and transparency. Investors are encouraged to report on their responsible investment activities and progress in implementing the PRI principles. Regular reporting enables

investors to demonstrate their commitment to responsible investment and provides stakeholders with information on their ESG practices (PRI, 2022).

By adhering to these six core principles, investors can integrate ESG factors into their decision-making processes, actively engage with companies, promote transparency and disclosure, advocate for responsible practices, collaborate with peers, and ensure accountability in their responsible investment efforts (PRI, 2016).

2.4.4 United Nations Sustainable Development Goals

The United Nations Development Group (UNDG) is an association of various United Nations agencies, funds, and programs working collectively to promote sustainable development and achieve the Sustainable Development Goals (SDGs). Established in 1997, the UNDG serves as a platform for coordination, collaboration, and coherence among UN entities involved in development activities. It enhances the effectiveness of the UN system by fostering joint initiatives, sharing best practices, and providing a common approach to development challenges.

Key functions of the UNDG include facilitating policy coherence, supporting national development strategies, and advocating for the integration of the three pillars of sustainable development: economic development, social inclusion, and environmental sustainability. The UNDG also promotes partnerships with governments, civil society, and the private sector to mobilise resources and expertise for development initiatives.

By fostering a unified and coordinated approach, the UNDG plays a crucial role in advancing the global development agenda and supporting countries in their efforts to achieve sustainable and inclusive development.

Table 2.2: United Nation Sustainable Development Goals and ESG

United Nation Sustainable Development Goals	Description	Environmental, social and governance (ESG)
No Poverty	End poverty in all its forms everywhere	Social

Zero Hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Social
Good Health and Well-Being	Ensure healthy life and promote well-being for all at all ages	Social
Quality Education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Social
Gender Equality	Achieve gender equality and empower all women and girls	Social
Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all	Environmental
Affordable and Clean Energy	Ensure access to affordable, reliable, sustainable and modern energy for all	Environmental
Decent Work and Economic Growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	-
Industry, Innovation and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	-
Reduced Inequalities	Reduce inequality within and among countries	Social
Sustainable Cities and Communities	Make cities and human settlements inclusive, safe, resilient and sustainable	Environmental

Responsible Consumption and Production	Ensure sustainable consumption and production patterns	Environmental
Climate Action	Take urgent action to combat climate change and its impacts	Environmental
Life below Water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Environmental
Life on Land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Environmental
Peace, Justice and Strong Institutions	Promotes peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Social
Partnerships for the Goals	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development	-

2.5 ESG Components

In a nutshell, the ESG are the crucial components used to evaluate the sustainability and ethical practices of a company of investment.

2.5.1 Environmental

The environmental factor of ESG focuses on a company's impact on the natural world. The 'E' in Environmental, Social, and Governance (ESG) contain a range of critical factors that underscore an organisation's commitment to ecological sustainability (Farnsworth, 2022). Biodiversity loss and climate change, pressing global concerns, necessitate proactive strategies to mitigate their impact (Farnsworth, 2022). Reduced carbon emissions and the embrace of renewable energy sources demonstrate a dedication to minimising the carbon footprint and transitioning to cleaner energy alternatives (Farnsworth, 2022). Green building initiatives underscore a responsible approach to construction, enhancing energy efficiency and reducing environmental strain (Farnsworth, 2022). Sustainable investments prioritise ventures that align with environmental goals, driving positive change (Farnsworth, 2022). Addressing deforestation safeguards natural habitats and supports responsible resource management (Farnsworth, 2022). Efforts to reduce waste and pollution through efficient practices further contribute to environmental preservation (Farnsworth, 2022). Mindful water usage and respecting native title rights acknowledge the importance of equitable resource allocation and cultural heritage protection (Farnsworth, 2022). In conclusion, evaluating a company's environmental performance helps investors gauge its commitment to sustainable practices and its potential exposure to environmental risks (Starr, 2022).

2.5.2 Social

The social factor of ESG looks at a company's relationships with its employees, customers, suppliers, and local communities. In the Environmental, Social, and Governance (ESG) considerations, the 'S' factor includes ranges of important aspects that address social well-being and equity (Farnsworth, 2022). Diversity and inclusion, encompassing factors like race and gender, are crucial in fostering a workplace that respects and values all individuals, irrespective of their background (Farnsworth, 2022). Human rights, anti-discrimination efforts, and combating modern slavery are integral elements that underscore ethical business practices, ensuring that organisations uphold fundamental human dignity within their supply chains and sourcing processes. Measures against bullying and harassment foster a safe and respectful work environment (Farnsworth, 2022).

Moreover, respecting data privacy upholds individuals' rights in a digital age, while recognising native title and cultural heritage preserves the rights of indigenous and First Nation people (Farnsworth, 2022). Health and safety practices ensure the well-being of employees, while privacy and data security reflect a commitment to safeguarding stakeholders' information (Farnsworth, 2022). These factors highlight the intersections of S in ESG, and it is important because understanding a company's social performance provides insights into its corporate culture, stakeholder relationships, and reputation (Starr, 2022).

2.5.3 Governance

The governance factor of ESG evaluates a company's leadership, structure, and internal processes. The 'G' in Environmental, Social, and Governance (ESG) encompasses the fundamental principles that shape the core foundations of effective governance within organisations. Transparency serves as the bedrock, ensuring open communication of policies, practices, and performance (Farnsworth, 2022). Leadership and accountability guide the ethical conduct of executives and managers, fostering a culture of responsibility (Farnsworth, 2022). Sound decision-making processes, coupled with board independence, reflect a commitment to well-informed and unbiased choices (Farnsworth, 2022). Embracing diversity on boards and throughout the organisation enriches perspectives and strengthens governance (Farnsworth, 2022). Strategic oversight contributes to long-term sustainability and value creation (Farnsworth, 2022). Shareholder activism underscores the role of investors in holding organisations accountable for ethical and responsible behaviour (Farnsworth, 2022). The fight against bribery and corruption safeguards integrity and trust. Effective risk mitigation and management strategies anticipate and address potential vulnerabilities (Farnsworth, 2022). Strong corporate governance ensures accountability, fairness, and ethical decision-making within an organisation (Starr, 2022).

In a nutshell, the details of the ESG components are illustrated in the following affinity diagram (Figure 2.1).

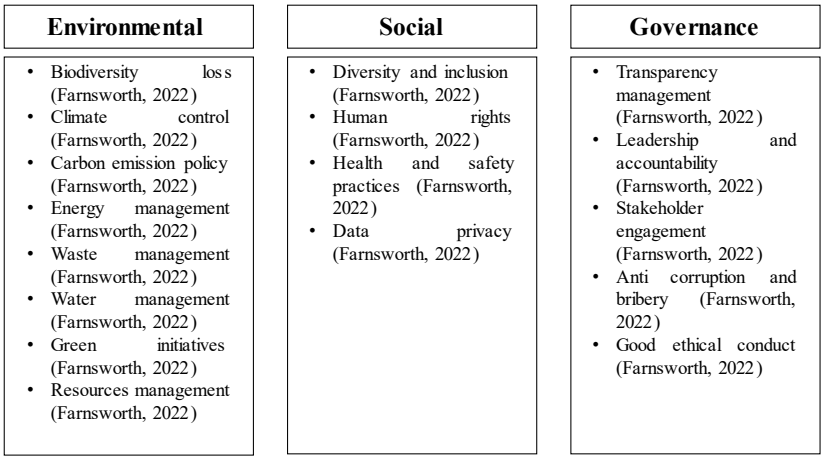

Figure 2.1: Affinity diagram of ESG

2.6 ESG in the Construction Industry

ESG has made its way into the construction sector, which is the aim of this research. Environmental, Social, and Governance (ESG) principles are gaining significant traction in the construction industry, reshaping how projects are conceived, executed, and evaluated. ESG integration addresses the industry's environmental impact, social responsibilities, and ethical governance, aligning it with broader sustainability goals.

The environmental aspect of ESG focuses on minimising the environmental impact of construction activities. This involves adopting sustainable building techniques that prioritise resource efficiency, energy conservation, and reduced emissions (Champ, 2022). Green building certifications like LEED (Leadership in Energy and Environmental Design) guide projects in utilising energy-efficient materials, installing energy-efficient systems, and incorporating renewable energy sources such as solar panels and wind turbines (Assef and Mangold, 2022). Construction companies also emphasise the reduction of waste through efficient construction and demolition practices, as well as promoting recycling and responsible waste disposal (Heller, 2022). Water management strategies, including rainwater harvesting and water-efficient plumbing systems, are integral components to address water scarcity challenges (Assef and Mangold, 2022).

ESG's social consideration in the construction industry encompasses diverse factors that impact stakeholders. Worker safety is paramount, with the industry implementing stringent safety protocols and training programs. Fair labour practices, such as providing decent wages and ensuring fair working hours, are central to ESG integration (Heller, 2022). Moreover, the industry's engagement with local communities is pivotal (Assef and Mangold, 2022). Consultation with local residents, understanding their needs, and addressing potential concerns ensure that projects align with the community's well-being (Assef and Mangold, 2022). Besides, it puts the focus on upskilling the staff by providing training for them to become subject matters and have a great understanding on ESG goals (Low, Montella and Schaafsma, 2023). The push for diversity and inclusion encourages companies to foster workplaces that are representative of the larger society, providing equal opportunities for all regardless of gender, ethnicity, or background (Assef and Mangold, 2022).

Governance consideration within the construction industry emphasises transparency, accountability, and responsible decision-making. This involves open reporting of environmental and social practices, enabling stakeholders to assess the industry's performance and progress (Champ, 2022). Anti-corruption measures are integral, with ethical governance frameworks ensuring that construction projects are executed without bribery or unethical practices (Heller, 2022). Responsible procurement practices also come into play, ensuring that suppliers and contractors adhere to ESG standards (Champ, 2022). Companies prioritise board independence, aiming to eliminate conflicts of interest and ensure decisions are made in the best interest of both stakeholders and the broader society (Assef and Mangold, 2022). Focusing on due diligence in selection of subcontractor and supplier also reduce the dispute and error during the project lifecycle and ensure the customer satisfaction (Heller, 2022).

In conclusion, ESG's integration in the construction industry marks a paradigm shift towards responsible and sustainable development. By addressing environmental concerns, social equity, and ethical governance, the industry is embracing a holistic approach that not only benefits projects and stakeholders but also contributes to a more resilient and equitable world. The construction industry's commitment to ESG principles reflects its dedication to responsible progress that is in harmony with the environment, society, and ethical standards.

In short, the details of ESG in construction industry is illustrated in the following affinity diagram (Figure 2.2).

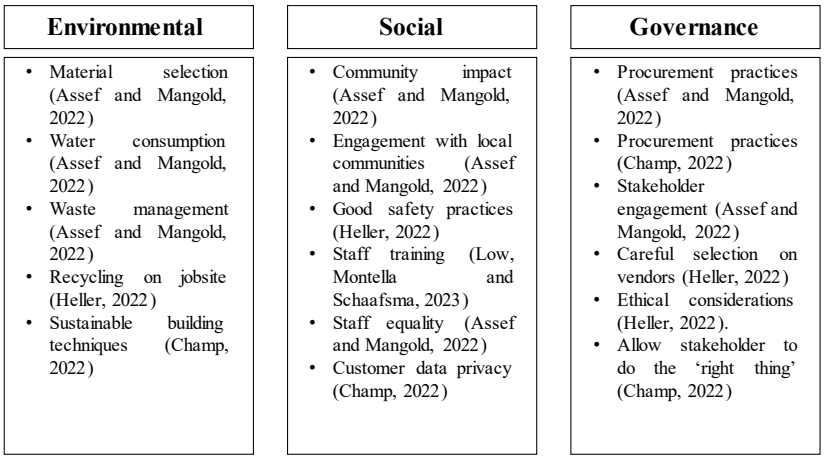

Figure 2.2: Affinity diagram of ESG in Construction Industry

2.7 ESG in the Malaysian Construction Companies

Table 2.2 illustrates the ESG practices within Malaysian construction companies. The findings were extracted from a comprehensive analysis of 40 companies' annual reports. All the selected companies are listed in Kuala Lumpur Stock Exchange (KLSE). The ESG practices are presented in order from the most cited to the least cited. The most frequent activity under environmental consideration is Environmental management which has 34 score and energy management with 22 score. Environmental management includes water conservation, waste management, noise controlling, air quality monitoring, recycle, reuse and reduce (3R). As for social consideration, employee training and development has the highest score of 27 followed by diversity and equality and employee benefits with 26 score and health and safety with 23 score. Lastly, governance consideration includes stakeholder engagement with 31 score, anti-corruption and bribery with 22 score and code of conduct and ethics with 22 score. For a more detailed breakdown, please refer to the detail listed in the Appendix B.

Table 2.3: ESG in Malaysia construction companies

Environmental	Social	Governance

• Environmental management (34) • Energy management (22) • Green initiatives (6) • Digitalisation (3) • Material consumption (3) • Biodiversity and ecology (2) • Education and awareness (1)	• Employee training and development (27) • Diversity and equality (26) • Employee benefits (26) • Health and safety (23) • Community engagement (14) • Customer data privacy (3) • Customer satisfaction (1)	• Stakeholder engagement (31) • Anti-corruption and bribery (22) • Code of conduct and ethics (22) • Sustainability governance (12) • Procurement practices (4) • Supply chain management (4) • Materiality assessment (3) • Transparency (2)

2.8 ESG Practices Among Industrial Practitioners

The adoption of Environmental, Social, and Governance (ESG) practices shows notable variation across different nature of company business within the Malaysian construction supply chain. Each type of company business, for instance property development, consultancy services, construction business, and builder merchant engages with ESG principles differently and shapes its distinct strategic and operational approaches accordingly.

According to Jia (2022), property developers are instrumental from the project's inception through to its completion, overseeing all aspects of planning, design, and financing. Their approach to ESG typically involves the use of sustainable building materials and the implementation of energy-efficient design principles, with an aim towards achieving environmental certifications like GBI, LEED or BREEAM. These efforts are guided by a vision of minimising long-term environmental impact. On the social front, property developers actively engage with local communities, addressing their concerns, ensuring the provision of affordable housing, and contributing to infrastructure improvements. From a governance perspective, they focus on maintaining high levels of transparency, adhering strictly to building codes and regulations, and upholding ethical standards in all their dealings.

Sajwani (2023) stated that consultants are particularly those specialising in engineering and sustainability, they provide expert advice on best

practices and manage the complexities associated with large projects. They are leaders in championing sustainable practices, conducting thorough environmental impact assessments, and developing innovative strategies to reduce carbon emissions. Socially, consultants ensure that projects meet required social standards and contribute positively to societal welfare, while their governance role includes aiding projects in meeting regulatory compliance and upholding ethical practices.

According to Kelly (2024), contractors are responsible for the day-to-day execution of construction activities, focus primarily on operational aspects of ESG. Environmentally, their efforts are centred around effective waste management, pollution control, and the efficient use of resources. They prioritise the health and safety of their workforce, aiming to reduce the impact of construction activities on surrounding communities. In terms of governance, contractors are committed to fair labour practices and rigorous maintenance of legal and compliance documentation, ensuring that all activities are conducted within a framework of good governance.

According to Grant and Stone (2022), builder merchants play a critical role in enhancing the sustainability of the construction supply chain by supplying materials and tools that are environmentally friendly. They strive to optimise logistics to minimise carbon emissions and ensure that their procurement practices are ethically sound (Jennie, 2022). Socially, builder merchants are responsible for verifying that their suppliers adhere to fair labour practices and may also participate in community support programs. In governance terms, they ensure compliance with relevant supply chain regulations and maintain a high level of transparency in their business operations.

In summary, ESG principles are integrated across these diverse roles within the Malaysian construction supply chain in ways that reflect the unique impact and responsibility of each business. This integration not only enhances the overall sustainability and ethical standards of the construction industry but also contributes significantly to broader societal objectives.

CHAPTER 3

METHODOLOGY AND WORK PLAN

3.1 Introduction

This chapter includes research approach under section 3.2 where questionnaire design were discussed such as usage of closed ended and open-ended questions. It also includes the demographic information of the respondents. Furthermore, sampling design, sample size, targeted respondents and research unit were also discussed. In section 3.3, pilot test was conducted to test the understandable level of the questions designed. While section 3.4 discussed the research hypothesis for this research study. Section 3.5 explained the data analysis methods used in this research study. Lastly, section 3.6 emphasised on the research ethics for this research study.

3.2 Research Approach

In this research, the research approach employed in this study utilises a mixed-methods approach, integrating both qualitative and quantitative methodologies to provide a comprehensive understanding of the research topic. The survey questionnaire will consist of both closed-ended and open-ended questions. Responses obtained from closed-ended questions was evaluated using quantitative analysis. Quantitative analysis uses the numerical data to identify patterns, trends, and correlations, providing statistical validity and generalizability to the findings. On the other hand, qualitative analysis was utilised for the open-ended ones. Qualitative analysis allows for a deeper exploration of participants' perspectives, experiences, and meanings attached to the research, enabling a more nuanced understanding of the research context. Platforms such as LinkedIn, email, Facebook, and more are used to distribute the survey questionnaire. The survey questionnaire was available on Google Form for responses from 25th December 2023 to 15th April 2024. Further information on the questionnaire's design and structure is elucidated in the subsequent section.

3.2.1 Questionnaire Design

The survey questionnaire was structured into two parts, closed-ended and open-ended segments. Section A, dedicated to closed-ended questions, sought insights into the practices and cognitive of ESG within the construction supply chain. Section B, featuring open-ended questions, aimed to delve into the organisation's implementation of ESG practices, identify challenges encountered in the process, and explore potential strategies to enhance ESG implementation within the community. Demographic information was gathered in Section C. The survey questionnaire were constructed based on the three key constituents (environmental, social and governance) from international institutions documents and annual reports of construction companies as illustrated in Figure 3.1. A detailed view of the survey questionnaire can be found in Appendix A.

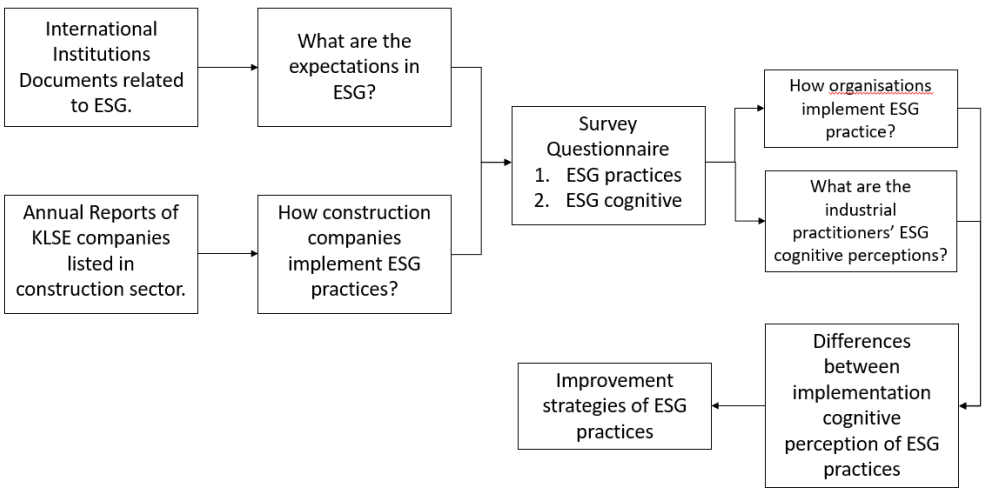

Figure 3.1: Conceptual Framework for ESG Practices and Cognitive in Malaysian Construction Supply Chain

(a) Closed ended Questions

There are 22 statements addressing the practicability of ESG in construction supply chain organisation under questionnaire Section A. All statements are aligned with the three key components of the ESG derived from the literature review. Respondents are expected to express their opinions using a five-point likert scale. In Section A1, choices range from 'never,' 'rarely,' 'sometimes,' 'often,' to 'always.' Whereas Section A2 and B, choices range from 'strongly

disagree,' 'disagree,' 'neutral,' 'agree,' to 'strongly agree.' Table 3.1 illustrates the ESG Practices and Cognitive Statements in the questionnaire, along with corresponding statements for each of the three key constituents. Meanwhile, Table 3.2 provides an outline of how ESG practices impact the organisational performance of Malaysian construction supply chain organisations. These questions aim to study the research findings through a questionnaire survey.

Table 3.1: Statement Summary for Section A (A1, A2)

Ref. code	ESG Practices & ESG Cognitive	Environmental	Social	Governance
A1	To what extent your company practices the following?	6	8	8
A2	To what extent do you agree that the following are important to an organisation?	6	8	8

Table 3.2: Statement Summary for Section A (A3)

Ref. code	ESG Impacts
A3_1	Financial Performance
A3_2	Risk Mitigation
A3_3	Innovation and Competitiveness
A3_4	Talent Management
A3_5	Reputation
A3_6	Access to Capital
A3_7	Legal and Regulatory Compliance
A3_8	Social and Environmental Impact
A3_9	Supply Chain Relationships
A3_10	Investor and Consumer Confidence

(b) Open-ended Questions

Section B features open-ended questions that give respondents the opportunity to share their ideas and experiences voluntarily. In this section, four questions are presented as outlined in Table 3.3.

Table 3.3: Open-ended questions on Section B

Ref. code	Questions
B1	Does your organisation have a formal ESG in place?
B2	Does your organisation have a dedicated ESG team?
B3	What other advice would you suggest for integrating ESG principles into the construction supply chain?
B4	What is your vision for the opportunities and challenges of ESG in the construction industry?

(c) Demographic Information

Section C is dedicated to the biodata of the respondents, as detailed in Table 3.4. The attributes of the respondents are analysed to support the hypotheses constructed in Section 3.4.

Table 3.4: Demographic Data collected in Section C

Ref. code	Respondent's Attributes
D1	Company's business activities
D2	Working experience
D3	Company size
D4	Numbers of employees within the company
D5	Yearly sales turnover in the company

D3, D4 and D5 is used to classify the size of company according to the definition of SME Corporation Malaysia (SME Corp. Malaysia), the central coordinating agency (CCA) under the Ministry of Entrepreneur & Cooperatives Development (MECD).

3.2.2 Sampling Design

The sampling design for this research involves careful consideration of the target population and the sampling technique to ensure the representativeness and generalisability of the study. The rationale behind the sampling strategy, the determination of the sample size, and the targeted population of respondents are elaborated in the subsequent sections.

3.2.3 Sampling Strategy

The sampling strategy for this study is meticulously designed to select participants or units from the target population in a systematic and representative manner. Through a careful consideration of the research objectives, population characteristics, and available resources, the sampling strategy determines the most appropriate approach for obtaining a sample that accurately reflects the population of interest. The Malaysian construction supply-chain community will be targeted for data collection in this research through random sampling. The sole criterion for survey participation is being part of the construction supply-chain community. The sampling strategy also ensures that the selected sample is sufficiently large and diverse to allow for meaningful analysis and generalisation of findings while minimising bias and maximising the validity and reliability of the study results.

3.2.4 Sample Size

The Central Limit Theorem (CLT) is used to establish the ideal sample size. According to the CLT, a sample size of at least 30 is generally adequate for approximating a normal distribution in most cases (Frost, 2018). Consequently, the CLT was applied in this research, particularly for subgroup comparisons, like examining the ESG practices within construction organisations and the acknowledgement of ESG practices among the construction organisations. It is determined that a minimum of 200 samples is needed.

Uma Sekaran and Roger Bougie (2016, p.264) cited Rules of Thumb proposed by Roscoe (1975) who had provided guidelines for determining sample size in research studies. According to these guidelines, sample sizes ranging from larger than 30 to less than 500 are generally appropriate for most research. When breaking samples into subgroups, such as working professions

or years of working experience, a minimum sample size of 30 per category is necessary. In multivariate research, particularly in multiple regression analyses, the sample size should ideally be several times (preferably ten times or more) larger than the number of variables in the study. Additionally, for simple experimental research with stringent experimental controls like matched pairs, successful research outcomes can be achieved with sample sizes as small as 10 to 20.

3.2.5 Targeted Respondents

The intended participants for this study are individuals working in the field of construction in Malaysia. They represent different business organisations and come from various professions, age groups, and educational backgrounds.

3.2.6 Research Unit

The research units for this study are centred on individuals' perspectives. Section A investigates the organisational practices and cognitive perceptions of ESG within the Malaysian construction supply chain. This section is structured into sub-questions identified as A1, A2, and A3. A1 specifically examines individual perspectives on the organisational practices of ESG. A2 focuses on individuals' perceptions regarding the cognitive aspects of ESG. Lastly, A3 explores the impact of ESG practices on organisational performance.

3.3 Pilot Test

A pilot test on the survey questionnaire was conducted prior to its official distribution to the construction community. Ten responses were received, indicating that the questionnaire is generally clear and comprehensible. As no questions were deemed unclear, and there were no additional suggestions for improvement, the questionnaire was deemed suitable for release.

3.4 Research Hypothesis

Table 3.4 tabulated four pairs of hypothesis statements constructed for hypothesis testing on the practices and cognitive of ESG among construction supply chain organisations. Each pair of hypothesis statements are tested through the questionnaire survey.

Table 3.5: Research Hypothesis

Item	Hypothesis (H) and Null hypothesis (H_o)
$H1_a$	There is a significant difference in ESG practices based on the attributes of respondents within the Malaysian construction supply chain.
$H1_o$	There is no significant difference in ESG practices based on the attributes of respondents within the Malaysian construction supply chain.
$H2_a$	There is a significant difference in cognitive perceptions of ESG practices based on the attributes of respondents within the Malaysian construction supply chain.
$H2_o$	There is no significant difference in cognitive perceptions of ESG practices based on the attributes of respondents within the Malaysian construction supply chain.
$H3_a$	There is a significant difference in awareness of the impacts of ESG practices on organisational performance based on the attributes of respondents within the Malaysian construction supply chain.
$H3_o$	There is no significant difference in awareness of the impacts of ESG practices on organisational performance based on the attributes of respondents within the Malaysian construction supply chain.
$H4_a$	There is a significant difference in Organisational Practices and Cognitive Perception within the Malaysian construction supply chain.
$H4_o$	There is no significant difference in Organisational Practices and Cognitive Perception within the Malaysian construction supply chain.

3.5 Data Analysis

Quantitative analysis employed the Statistical Package for Social Sciences (SPSS) to analyse the gathered data, utilising tests such as Arithmetical Mean,

Cronbach's alpha reliability test, Friedman's Test, Shapiro Wilk test, Kruskal-Wallis H Test and Wilcoxon signed-rank Test.

3.5.1 Descriptive Statistics

The detailed summary of the results was presented using frequency, percentages, mean rank, and mode (Simplilearn, 2021). Frequency distribution was employed to represent demographic details of the respondents.

(a) Cronbach's Alpha reliability test

The Cronbach's Alpha reliability test is conducted to assess the reliability of the questionnaire used in this study, which explores organisational practices of ESG, cognitive perceptions of ESG practices, and the impacts of ESG practices within Malaysian construction supply chain organisations. According to Frost (2022), this test helps to determine the internal consistency of the questions related to each of these areas, ensuring that the instrument is reliable for measuring the intended variables in the research. Cronbach's Alpha ranges from 0 to 1, where higher values indicate greater internal consistency. Generally, a value of 0.70 or higher is considered acceptable for research purposes.

(b) Shapiro Wilk test

According to Malato (2023), the Shapiro Wilk test is utilised to evaluate the non-parametric nature of the data gathered via the questionnaire. This test is applied to the responses concerning organisational practices of ESG, cognitive perceptions of ESG practices, and the impacts of ESG practices within Malaysian construction supply chain organisations. If the p-value obtained from the Shapiro Wilk test is less than the chosen significance level (usually 0.05), the null hypothesis is rejected, indicating that the data significantly deviates from a normal distribution, confirming its non-parametric characteristics.

3.5.2 Inferential Statistics

(a) Friedman's Test

The Friedman test is a non-parametric statistical method used to assess differences across multiple related groups, as seen in this research, where it evaluates variations in the means of different questions related to organisational

practices of ESG, cognitive perceptions of ESG practices, and ESG practice impacts. The process involves ranking the data within each category and then comparing these ranks across the groups. If significant discrepancies are found among these average ranks, it indicates that the distribution in at least one group differs from the others. The Friedman test is particularly valuable in studies where the same subjects are evaluated under various conditions or at different times, making it ideal for longitudinal or repeated measures designs.

(b) Kruskal-Wallis H Test

The Kruskal-Wallis H Test is a non-parametric statistical method used to determine if there are statistically significant differences between two or more groups of an independent variable when assessing a continuous or ordinal dependent variable. In this study, the test is applied to evaluate significant differences in organisational practices of ESG, cognitive perceptions of ESG practices, and ESG practice impacts, with respect to varying factors such as business nature, years of working experience, and company size.

(c) Wilcoxon signed-rank Test

The Wilcoxon signed-rank test is a non-parametric statistical test used to determine if there are statistically significant differences between the median ranks of two related samples. In this research, it is applied to evaluate whether there are significant differences between the mean ranks of organisational practices of ESG and cognitive perceptions of ESG practices based on the responses from the respondents.

3.5.3 Qualitative data analysis

According to Hotjar (2022), the qualitative data analysis approach involves systematically organising descriptive data gathered from interviews, focus groups, surveys, and observations, and then interpreting it. This methodology aims to identify patterns and themes within textual and other non-quantifiable data, as opposed to numerical data. Thematic analysis serves as the data analysis approach in this research. Thematic analysis is a qualitative research method used to identify and interpret patterns or themes within textual or visual data. It involves systematically organising and coding the data to highlight significant

features, such as recurring ideas or concepts, and understanding their deeper meanings.

3.6 Research Ethics

Taking part in the questionnaire survey is entirely optional, and participants have the freedom to withdraw at any point. Respondents can trust that their information will be handled with the highest level of privacy and confidentiality, and no sharing or disclosure will take place without their explicit consent. Any collected data, which may include personal information, will be solely used for the purposes outlined in this research. All necessary measures will be implemented to safeguard the confidentiality of all information, samples, and specimens provided by the volunteers. When presenting this study or publishing its results, the names and any other identifying details of the volunteers will not be disclosed. Finally, before submitting the questionnaire survey, participants were encouraged to read through the consent form and the UTAR privacy notice, which were accessible via a hyperlink provided within the questionnaire.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

The responses were collected through google form questionnaire to conduct this chapter. The respondents' background is shown in Table 4.1 and the following Section 4.2 highlights the attributes of major respondents. Section 4.3 shows the reliability of the questionnaire construct used in the survey. In Section 4.4, the results derived from inferential statistics are presented. The tests utilised include Friedman's Test for ranking organisational practices and cognitive perceptions, Kruskal-Wallis H Test for assessing the significance difference of organisational practices and cognitive perceptions based on respondents' attributes, and Wilcoxon signed-rank Test for identifying significant differences between organisational practices and cognitive perceptions. Lastly, section 4.5 discusses on the results obtained in section 4.4.

4.2 Respondents' Background

Table 4.1 summarise 211 respondents' attributes that took part in the survey questionnaire. Majority of the respondents are from organisation involved in Construction Businesses (47.9%), with working experience of less than 5 years (62.1%) and in the medium sized company (50.2%).

Table 4.1: Demographic Information of the Respondents (N=211)

Demographic Background	Frequency (n)	Percentage (%)
Company's Main Business Activity		
Property Development	27	12.8
Consultancy Services	74	35.1
Construction Businesses	101	47.9
Materials/Equipment/Machinery Tradings	9	4.3
Working Experiences		
Less than 5 years	131	62.1

6 – 10 years	59	28.0
More than 10 years	21	10.0
Company Size		
Micro	5	2.4
Small	69	32.7
Medium	106	50.2
Large	31	14.7
Number of employees		
Less than 5	7	3.3
5 to less than 75	117	55.5
75 to less than or equal to 200	68	32.2
More than 200	19	9.0
Company's sales		
Less than RM300,000	7	3.3
RM300,000 to less than RM15 mil	100	47.4
RM15 mil to less than or equal to RM50 mil	75	35.5
More than RM50 mil	29	13.7

4.3 Reliability Analysis

4.3.1 Cronbach's Alpha Reliability Test

The following Tables 4.2, 4.3 and 4.4 lists the result of reliability test of the questionnaire construct of the organisational practices of ESG (Questionnaire - Section A1), cognitive perceptions of ESG practices among the construction supply chain organisation (Questionnaire - Section A2) impacts of ESG practices on organisation performance (Questionnaire – Section A3). All reliability coefficients, as indicated by the Cronbach's Alpha values, exceed 0.75. This indicates a high degree of internal reliability among the connected statements within the respective parts of the questionnaire structure.

Table 4.2: Reliability test of the questionnaire structure on Organisational Practices of ESG

Section of Questionnaire	Number of items	Cronbach's Alpha
Organisational Practices of ESG	**22**	**0.958**
Environmental (A1_1-6)	6	0.895
Social (A1_7-14)	8	0.912
Governance (A1_15-22)	8	0.914

Table 4.3: Reliability test of the questionnaire structure on Cognitive Perceptions of ESG

Section of Questionnaire	Number of items	Cronbach's Alpha
Cognitive Perceptions of ESG	**22**	**0.968**
Environmental (A2_1-6)	6	0.911
Social (A2_7-14)	8	0.931
Governance (A2_15-22)	8	0.929

Table 4.4: Reliability test of the questionnaire structure on ESG Practice Impacts

Section of Questionnaire	Number of items	Cronbach's Alpha
ESG Practice Impacts	10	0.936

4.3.2 Shapiro Wilk Test

Table 4.5 shows that the statistics of Shapiro Wilk Test of the responses of questionnaire. The significant statistic results (<.001) imply the non-parametric nature of the data. As the result, non-parametric tests of Friedman's Test, Kruskal-Wallis H Test and Wilcoxon signed-rank Test will be adopted for the subsequent statistics tests to interfere the generalisable outcomes.

Table 4.5: Shapiro Wilk Test of the normal distribution of Questionnaire Constructs

Section of Questionnaire	Statistics	Sig.	Section of Questionnaire	Statistics	Sig.	Section of Questionnaire	Statistics	Sig.
A1_1	0.865	<0.001	A2_1	0.781	<0.001	A3_1	0.762	<0.001
A1_2	0.852	<0.001	A2_2	0.772	<0.001	A3_2	0.760	<0.001
A1_3	0.870	<0.001	A2_3	0.764	<0.001	A3_3	0.730	<0.001
A1_4	0.857	<0.001	A2_4	0.685	<0.001	A3_4	0.739	<0.001
A1_5	0.845	<0.001	A2_5	0.746	<0.001	A3_5	0.724	<0.001
A1_6	0.879	<0.001	A2_6	0.773	<0.001	A3_6	0.745	<0.001
A1_7	0.874	<0.001	A2_7	0.720	<0.001	A3_7	0.717	<0.001
A1_8	0.841	<0.001	A2_8	0.690	<0.001	A3_8	0.750	<0.001
A1_9	0.856	<0.001	A2_9	0.724	<0.001	A3_9	0.763	<0.001
A1_10	0.854	<0.001	A2_10	0.653	<0.001	A3_10	0.743	<0.001
A1_11	0.858	<0.001	A2_11	0.701	<0.001			
A1_12	0.855	<0.001	A2_12	0.743	<0.001			
A1_13	0.846	<0.001	A2_13	0.705	<0.001			
A1_14	0.826	<0.001	A2_14	0.691	<0.001			
A1_15	0.844	<0.001	A2_15	0.719	<0.001			
A1_16	0.841	<0.001	A2_16	0.723	<0.001			

A1_17	0.824	<0.001	A2_17	0.712	<0.001
A1_18	0.836	<0.001	A2_18	0.739	<0.001
A1_19	0.831	<0.001	A2_19	0.747	<0.001
A1_20	0.846	<0.001	A2_20	0.765	<0.001
A1_21	0.851	<0.001	A2_21	0.749	<0.001
A1_22	0.859	<0.001	A2_22	0.721	<0.001

4.4 Results

4.4.1 ESG Practices in the Malaysian Construction Supply Chain Organisation

Table 4.6 shows the results of arithmetical mean on ESG practices in the Malaysian construction supply chain organisation. Among the three constituents of ESG Practices, 'Governance' is the most commonly implemented in the organization (Mean = 3.94). It is followed by 'Social' (Mean = 3.85) and the 'Environmental' is the least implemented (Mean = 3.79).

Table 4.6: ESG Practices in the Malaysian Construction Supply Chain Organisation

ESG Practices	Mean
Overall Organisational Practices	**3.86**
Environmental (A1_1-A1_6)	3.79
Social (A1_7-A1_14)	3.85
Governance (A1_15-A1_22)	3.94

Table 4.7 reveals that procurement practices, code of conduct and ethics, anti-corruption and bribery, customer satisfaction and stakeholder engagement are the five most implemented ESG practices in the construction organisation. Whereas green initiatives, environmental management and biodiversity and ecology are the three least implemented practices by the organisation. The detailed findings of all 22 items are presented in Appendix C. The results of the Friedman test indicate all the results are statistically significant with $\chi 2 = 73.093$, $\rho < 0.001$ as presented in Table 4.7.

Table 4.7: Most implemented and least implemented ESG Practices in the Malaysian Construction Supply Chain Organisation

Ref. code	Statements	Mean Rank	Chi-square	Asymp. Sig.
Most implemented ESG Practices			73.093	<0.001
A1_19	Procurement Practices	12.80		
A1_17	Code of Conduct and Ethics	12.49		

A1_16	Anti-corruption and Bribery	12.30
A1_14	Customer Satisfaction	12.22
A1_15	Stakeholder Engagement	11.94
Least implemented ESG Practices		
A1_3	Green initiatives	10.82
A1_1	Environmental Management	10.73
A1_6	Biodiversity and Ecology	9.97

Table 4.8 shows the results of arithmetical mean on ESG practices of the industrial practitioners involved in the different nature of business activities. Among the types of business activities, developers' ESG practices are commonly found in the social (Mean= 4.05) and governance aspects (Mean= 4.06) whereas Merchant has the highest ESG practices score for environmental aspects (Mean= 3.99). Overall, developer has the highest overall score of ESG practices (Mean= 4.03) among the different types of business activities.

Table 4.8: ESG practices within the Industrial Practitioners among different Nature of Business Activities

Business Activities	Environmental	Social	Governance	**Overall ESG Practices**
Developer	3.99	4.05	4.06	**4.03**
Consultant	3.54	3.70	3.85	**3.70**
Contractor	3.90	3.91	3.97	**3.93**
Merchant	4.00	3.96	3.96	**3.97**

a. Hypothesis 1 – The differences in ESG practices based on the attributes of respondents within the Malaysian construction supply chain

The result of rejected null hypothesis of Kruskal Wallis H tests are shown in the following Tables 4.9, 4.10 and 4.11.

i. Differences according to business activities

The result reveals that property developers have a higher ESG practices in “Green initiatives” (Mean Rank= 122.94), “Biodiversity and Ecology” (Mean Rank= 119.70), “Diversity and Equality” (Mean Rank= 128.57) and “Health and Safety” (Mean Rank= 120.20) whereas contractor have a higher ESG practice on “Employee Benefits” (Mean Rank= 115.85).

Table 4.9: Hypothesis testing in ESG practices implemented according to the types of Company Business Activities

Ref. code	Rejected Null Hypothesis	Mean Rank				Asymp. Sig.
		Property Development	Consultancy Services	Construction Business	Materials/Equipment/ Machinery Tradings	
A1_3	Green initiatives	122.94	85.23	115.54	118.89	0.002
A1_6	Biodiversity and Ecology	119.70	83.87	117.33	119.67	<0.001
A1_9	Diversity and Equality	128.57	97.97	106.10	103.11	0.009
A1_10	Employee Benefits	114.20	89.82	115.85	103.89	0.024
A1_11	Health and Safety	120.20	90.35	114.10	101.17	0.027

ii. Differences according to years of working experience

Those industrial practitioners with more than 10 years of working experience experienced higher ESG practices in “Environmental Management” (Mean Rank= 132.33), “Energy Management” (Mean Rank= 133.71), “Green Initiatives” (Mean Rank= 142.69), “Biodiversity and Ecology” (Mean Rank= 124.76), “Employee Training and Development” (Mean Rank= 147.95), “Employee Benefits” (Mean Rank= 142.40), “Health and Safety” (Mean Rank= 143.93), “Community Engagement” (Mean Rank= 143.55), “Sustainability Governance” (Mean Rank= 143.51). “Procurement Practices” (Mean Rank= 136.00) and “Transparency” (Mean Rank= 131.83).

Table 4.10: Hypothesis testing in ESG practices implemented according to the Years of Working Experience

Ref. code	Rejected Null Hypothesis	Mean Rank			Asymp. Sig
		Less than 5 years	6 - 10 years	More than 10 years	
A1_1	Environmental Management	97.86	114.70	132.33	0.014
A1_2	Energy Management	95.79	118.80	133.71	0.002
A1_3	Green Initiatives	94.87	117.64	142.69	<0.001
A1_6	Biodiversity and Ecology	98.02	117.05	124.76	0.031
A1_8	Employee Training and Development	100.07	104.23	147.95	0.001
A1_10	Employee Benefits	98.99	108.82	142.40	0.005
A1_11	Health and Safety	100.00	105.82	143.93	0.005
A1_12	Community Engagement	101.44	102.76	143.55	0.005
A1_18	Sustainability Governance	98.59	108.46	143.51	0.002
A1_19	Procurement Practices	99.77	109.16	136.00	0.021
A1_22	Transparency	98.59	113.26	131.83	0.024

iii. Differences according to company sizes

Industrial practitioners working in large-sized company have a higher experience of practices in “Anti-corruption and Bribery” (Mean Rank= 120.56) whereas those working in medium-sized company have an experience in practice on “Transparency” (Mean Rank= 116.76) compared to other company size.

Table 4.11: Hypothesis testing in ESG practices implemented according to the Company Size

Ref. code	Rejected Null Hypothesis	Mean Rank				Asymp. Sig.
		Micro	Small	Medium	Large	
A1_16	Anti-corruption and Bribery	102.50	90.73	111.84	120.56	0.042
A1_22	Transparency	82.20	95.12	116.76	97.27	0.048

4.4.2 Industrial Practitioners Cognitive Perceptions of ESG in the Malaysia Construction Supply Chain Organisation

Table 4.12 shows the results of arithmetical mean on Industrial Practitioners Cognitive Perceptions of ESG practices in the Malaysian construction supply chain. Among the three constituents of ESG Practices, 'Social' is most acknowledged in the organisation (Mean= 4.47). It is followed by 'Governance' (Mean= 4.41) and 'Environmental' being the least acknowledged (Mean= 4.35).

Table 4.12: Industrial Practitioners Cognitive Perceptions of ESG in the Malaysian Construction Supply Chain Organisation

Cognitive Perceptions	Mean
Overall Cognitive Perceptions	**4.41**
Environmental (A2_1-A2_6)	4.35
Social (A2_7-A2_14)	4.47
Governance (A2_15-A2_22)	4.41

Table 4.13 reveals that employee benefits, employee training and development, digitalisation, customer satisfaction and health and safety are the five most recognised ESG practices in the construction organisation. Whereas supply chain management, biodiversity and ecology and environmental management are the three least recognised by the construction organisation. The detailed results of all 22 items can be found in Appendix D. The results of the Friedman test indicate all the results are statistically significant with $\chi 2 = 84.004$, $\rho < 0.001$ as presented in Table 4.13.

Table 4.13: Most recognised and least recognised Cognitive Perceptions on ESG Practice in the Malaysian Construction Supply Chain Organisation

Ref. code	Statements	Mean Rank	Chi-square	Asymp. Sig.
Most recognised Cognitive Perceptions			84.004	<0.001
A2_10	Employee Benefits	12.55		

A2_8	Employee Training and Development	12.28
A2_4	Digitalisation	12.24
A2_14	Customer Satisfaction	12.23
A2_11	Health and Safety	12.04
Least recognised Cognitive Perceptions		
A2_3	Supply Chain Management	10.68
A2_1	Biodiversity and Ecology	10.63
A2_6	Environmental Management	10.37

Table 4.14 shows the results of arithmetical mean on Industrial Practitioners Cognitive Perceptions among different nature of business activities. Among the types of business activities, merchant are most aware on the importance of all three aspects of ESG practices with an overall score of 4.60.

Table 4.14: Industrial Practitioners Cognitive Perceptions of ESG among different Nature of Business Activities

Business Activities	Environmental	Social	Governance	**Overall Cognitive Perceptions**
Developer	4.44	4.45	4.49	**4.46**
Consultant	4.17	4.42	4.28	**4.29**
Contractor	4.44	4.50	4.48	**4.47**
Merchant	4.70	4.56	4.53	**4.60**

b. Hypothesis 2 – The differences in cognitive perceptions of ESG practices based on the attributes of respondents within the Malaysian construction supply chain

The result of rejected null hypothesis of Kruskal Wallis H tests are shown in the following Tables 4.15, 4.16 and 4.17.

i. Differences according to business practices

The result reveals that merchants have a greater cognitive perception in "Energy Management" (Mean Rank= 141.33), "Green Initiatives" (Mean Rank= 138.72)

and “Biodiversity and Ecology” (Mean Rank= 125.61) while property developer have a better cognitive perception in “Material Consumption” (Mean Rank= 119.54), “Supply Chain Management” (Mean Rank= 121.67) and “Materiality Assessment” (Mean Rank= 131.06).

Table 4.15: Hypothesis testing in Industrial Practitioners Cognitive Perceptions of ESG according to the types of Company Business Activities

Ref. code	Rejected Null Hypothesis	Mean Rank				Asymp. Sig.
		Property Development	Consultancy Services	Construction Business	Materials/Equipment/ Machinery Tradings	
A2_2	Energy Management	104.33	93.79	112.24	141.33	0.036
A2_3	Green Initiatives	113.61	93.11	110.50	138.72	0.039
A2_5	Material Consumption	119.54	89.22	113.75	116.33	0.013
A2_6	Biodiversity and Ecology	120.93	86.12	114.83	125.61	0.002
A2_20	Supply Chain Management	121.67	90.78	112.18	114.78	0.027
A2_21	Materiality Assessment	131.06	94.52	108.27	99.72	0.028

ii. Differences according to years of working experience

Those industrial practitioner with working experience more than 10 years of working experience have better cognitive perception on “Energy Management” (Mean Rank= 124.00), “Material Consumption” (Mean Rank= 128.62), “Biodiversity and Ecology” (Mean Rank= 122.19) and “Materiality Assessment” (Mean Rank= 137.21) while industrial practitioner with working experience between 6 - 10 years of working experience have a better cognitive perception on “Supply Chain Management” (Mean Rank= 120.80).

Table 4.16: Hypothesis testing in Industrial Practitioners Cognitive Perceptions of ESG according to the Years of Working Experience

Ref. code	Rejected Null Hypothesis	Mean Rank			Asymp. Sig
		Less than 5 years	6 - 10 years	More than 10 years	
A2_2	Energy Management	98.18	116.95	124.00	0.029
A2_5	Material Consumption	97.60	116.59	128.62	0.013
A2_6	Biodiversity and Ecology	97.02	120.17	122.19	0.012
A2_20	Supply Chain Management	98.57	120.80	110.76	0.035
A2_21	Materiality Assessment	95.79	117.57	137.21	<0.001

iii. Differences according to company sizes

Industrial practitioners working in micro-sized company have a greater awareness on “Anti-corruption and Bribery” (Mean Rank= 132.70) whereas those working in large-sized company have a better cognitive perception on “Transparency” (Mean Rank= 114.74) compared to other company size.

Table 4.17: Hypothesis testing in Industrial Practitioners Cognitive Perceptions of ESG according to the Company Size

Ref. code	Rejected Null Hypothesis	Mean Rank				Asymp. Sig.
		Micro	Small	Medium	Large	
A2_16	Anti-corruption and Bribery	132.70	87.62	115.18	111.21	0.006
A2_22	Transparency	104.80	90.33	113.70	114.74	0.032

4.4.3 ESG Practice Impacts on organisational performance in the Malaysia Construction Supply Chain Organisation

Table 4.18 reveals that Innovation and Competitiveness, Reputation, Legal and Regulatory Compliance, Talent Management and Access to Capital are the five most recognised ESG practice impacts on organisational performance. Whereas Risk Mitigation, Supply Chain Relationship and Financial Performance are the three least recognised ESG practice impacts on organisational performance. The detailed results of all 10 items are included in Appendix E. However, the results of the Friedman test are not statistically significant with $\chi 2 = 13.239$, $\rho = 0.152$ as presented in Table 4.18.

Table 4.18: ESG Practice Impacts on Organisational Performance in the Malaysian Construction Supply Chain Organisation

Ref. code	Statements	Mean Rank	Chi-square	Asymp. Sig.
Most impactful on organisational performance			13.239	0.152
A3_3	Innovation and Competitiveness	5.71		
A3_5	Reputation	5.70		
A3_7	Legal and Regulatory Compliance	5.70		
A3_4	Talent Management	5.54		
A3_6	Access to Capital	5.49		
Least impactful on organisational performance				
A3_2	Risk Mitigation	5.32		
A3_9	Supply Chain Relationships	5.30		
A3_1	Financial Performance	5.28		

c. Hypothesis 3 – The differences in awareness of the impacts of ESG practices on organisational performance based on the attributes of respondents within the Malaysian construction supply chain

The result of rejected null hypothesis of Kruskal Wallis H tests are shown in the following Tables 4.19, 4.20 and 4.21.

i. Differences according to business activities

The result reveals that merchants emphasised on “Financial Performance” (Mean Rank= 150.50), “Social and Environmental Impact” (Mean Rank= 146.06) and “Supply Chain Relationships” (Mean Rank= 118.50) as the ESG practice impact that affects the organisational performance.

Table 4.19: Hypothesis testing in ESG Practice Impacts on Organisational Performance according to the types of Company Business Activity

Ref. code	Rejected Null Hypothesis	Mean Rank				Asymp. Sig.
		Property Development	Consultancy Services	Construction Business	Materials/Equipment/ Machinery Tradings	
A3_1	Financial Performance	114.67	98.48	105.23	150.50	0.048
A3_8	Social and Environmental Impact	114.28	89.72	112.14	146.06	0.004
A3_9	Supply Chain Relationships	101.70	90.87	117.12	118.50	0.016

ii. Differences according to years of working experience

Those industrial practitioner with working experience more than 10 years emphasised on “Risk Mitigation” (Mean Rank= 129.69) whereas industrial practitioners with working experience from 6 – 10 years agreed that “Innovation and Competitiveness” (Mean Rank= 127.81), “Talent Management” (Mean Rank= 130.79), “Supply Chain Relationships” (Mean Rank= 122.76) and “Investor and Consumer Confidence” (Mean Rank= 121.37) as the ESG practice impact that affects the organisational performance.

Table 4.20: Hypothesis testing in ESG Practices Impacts on Organisational Performance according to the Years of Working Experience

Ref. code	Rejected Null Hypothesis	Mean Rank			Asymp. Sig
		Less than 5 years	6 - 10 years	More than 10 years	
A3_2	Risk Mitigation	97.77	115.83	129.69	0.013
A3_3	Innovation and Competitiveness	94.47	127.81	116.62	<0.001
A3_4	Talent Management	93.56	130.79	113.98	<0.001
A3_9	Supply Chain Relationships	96.29	122.76	119.45	0.005
A3_10	Investor and Consumer Confidence	98.32	121.37	110.71	0.025

iii. Differences according to company sizes

Industrial practitioners in large-sized company emphasised on “Reputation” (Mean Rank= 118.47) while industrial practitioners from medium-sized company emphasised on “Legal and Regulatory Compliance” (Mean Rank= 116.27) as the ESG practice impacts on their organisational performance.

Table 4.21: Hypothesis testing in ESG Practices Impacts on Organisational Performance according to the Company Size

Ref. code	Rejected Null Hypothesis	Mean Rank				Asymp. Sig.
		Micro	Small	Medium	Large	
A3_5	Reputation	65.80	91.49	113.69	118.47	0.009
A3_7	Legal and Regulatory Compliance	55.60	92.38	116.27	109.34	0.005

4.4.4 Organisational Practices and Cognitive Perception within the Malaysian Construction Supply Chain Organisation

The organisational practices and cognitive perceptions within the Malaysian construction supply chain organisation are tested in this section.

d. Hypothesis 4 – The differences in organisational practices and Cognitive Perception within the Malaysian construction supply chain

The result of rejected null hypothesis of Wilcoxon signed-rank Test are shown in the following Tables 4.22 and 4.23.

i. Differences in organisational practices and cognitive perception

The result reveals that the cognitive perception (Mean Rank= 106.65) in ESG practices is higher than the organisational practices (Mean Rank= 45.09) within the Malaysian construction supply chain organisation.

Table 4.22: Significant result of hypothesis testing on Organisational Practices and Cognitive Perception within the Malaysian Supply Chain Organisation

Statements	Mean Rank		Z	Asymp. Sig. (2-tailed)
	Organisational Practices	Cognitive Perceptions		
Overall ESG	**45.09**	**106.65**	**-10.918**	**<0.001**
Environmental Aspect	41.61	96.61	-10.193	<0.001
Social Aspect	49.48	98.65	-10.198	<0.001
Governance Aspect	46.54	100.94	-9.204	<0.001

Table 4.23: Significant result of hypothesis testing on Organisational Practices and Cognitive Perception within the Malaysian Supply Chain Organisation

Item	Statements	Mean Rank		Z	Asymp. Sig. (2-tailed)
		Organisational Practices	Cognitive Perceptions		
Environmental Aspects					
1	Environmental Management	55.50	67.54	-7.654	<0.001
2	Energy Management	49.00	61.06	-7.254	<0.001
3	Green Initiatives	47.50	64.17	-8.177	<0.001
4	Digitalisation	53.64	71.21	-8.093	<0.001

5	Material Consumption	60.64	65.13	-7.775	<0.001
6	Biodiversity and Ecology	54.79	66.55	-8.074	<0.001
Social Aspects					
7	Education and Awareness	48.89	71.16	-7.793	<0.001
8	Employee Training and Development	53.41	67.20	-8.344	<0.001
9	Diversity and Equality	61.50	62.05	-8.210	<0.001
10	Employee Benefits	53.23	68.20	-8.504	<0.001
11	Health and Safety	52.74	71.81	-7.288	<0.001
12	Community Engagement	51.10	67.55	-7.862	<0.001
13	Customer Data Privacy	63.78	65.20	-7.576	<0.001
14	Customer Satisfaction	61.53	62.07	-7.638	<0.001
Governance Aspects					
15	Stakeholder Engagement	55.50	63.69	-7.727	<0.001
16	Anti-corruption and Bribery	55.82	64.80	-6.781	<0.001
17	Code of Conduct and Ethics	57.82	64.30	-6.632	<0.001
18	Sustainability Governance	62.66	66.18	-6.682	<0.001
19	Procurement Practices	62.53	63.80	-5.553	<0.001
20	Supply Chain Management	49.48	60.73	-6.640	<0.001

21	Materiality Assessment	64.41	70.52	-7.613	<0.001
22	Transparency	57.00	70.84	-7.744	<0.001

4.4.5 Open-ended Questions

The responses provided from the respondents to study the four open-ended questions are analysed qualitatively and summarised as follows:

(a) Formal ESG and dedicated ESG Team within the organisation (B1 & B2)

There are 91 responses from the 211 respondents, 24 (26.37%) agreed that their company have a formal ESG in place within the while 67 (73.63%) disagreed.

Besides, from the 91 responses out of 211 respondents, 15 (16.48%) agreed that their organisation have a dedicated ESG Team within the organisation while 76 (83.52%) says otherwise.

(b) Integrating ESG Practices into the organisation (B3)

This section of the open-ended questions focused on recommendations for integrating ESG practices into Malaysian construction supply chain organisations. A total of 23 responses are collected, and the respondents often gave answers that were repetitive and overlapping. The responses have been analysed and summarised in Table 4. 24.

Table 4.24: Advice on ESG Integration into the Malaysian Construction Supply Chain Organisation

No.	Areas of Advice	Frequency (n)
1	Optimising Taxation and Incentives	11
2	Revise the National Sustainability Policy	9
3	Conduct ESG training sessions for employees	7
4	Ensure a solid grasp of ESG Principles	6

(c) Opportunities and challenges of ESG in the Construction Industry (B4)

This part of the open-ended questions studied on the opportunities and challenges of ESG in the construction industry. In this section, 23 responses were collected, and the respondents often gave answers that were repetitive and overlapping. The answers given are analysed and tabulated in Table 4.25.

Table 4.25: Opportunities and Challenges of ESG in the Construction Industry

No.	Opportunities and Challenges	Frequency (n)
	Opportunities	
1	Build Positive Reputation	10
2	Maximise Profit and Value	8
3	Attract Investors	7
4	Innovative Solution to Construction Issues	4
	Challenges	
1	Affect the Companies' revenue	7
2	Lack of Standardisation	6
3	Weak Policies	5
4	Lack of required knowledges	5

4.5 Discussion

4.5.1 Governance aspects of ESG practices are particular notable among other ESG practices

The findings from section 4.4.1 indicate that the most common organisational ESG practice implemented by organisations is focusing on governance aspects, with a mean score of 3.94 out of 5, especially in Procurement Practices, Code of Conduct and Ethics, Anti-corruption and Bribery, and Stakeholder Engagement. This aligns with the report by Champ, Heller, Assef, and Mangold reviewed in section 2.6. According to Champ (2022), governance in construction emphasises transparency, accountability, and responsible decision-making, involving openly reporting environmental and social practices for stakeholder evaluation and enforcing adherence to ESG standards by suppliers and contractors. Additionally, Heller (2022) highlighted the importance of anti-corruption measures to ensure projects remain free from bribery or unethical conduct. Finally, Assef and Mangold (2022) emphasised the need for companies to prioritise board independence to avoid conflicts and make decisions in the best interests of stakeholders and society.

4.5.2 The majority of industrial practitioners hold a cognitive perception of the social aspects of ESG practices.

The findings from section 4.4.2 reveals that the industrial practitioners acknowledges social aspects (mean = 4.47) of the ESG practices as the most important aspects, particularly in Employee Benefits, Employee Training and Development, Customer Satisfaction and Health and Safety. This indicates that social aspects of the ESG practices is highly acknowledged by the industrial practitioner which is in line with the literature review in section 2.6. According to Heller (2022), in order to prioritise worker safety, the industry implements strict safety protocols and training and conduct fair labour practices, including decent wages and reasonable hours, are central to ESG integration. Assef and Mangold (2022) emphasised the importance of engaging with local communities through consultation to align projects with community well-being, thereby ensuring customer satisfaction. They also highlighted the significance of fostering diversity and inclusion to create workplaces that are representative of society, offering equal opportunities regardless of gender, ethnicity, or background. Lastly, staff are also required to upskilled through training to better understand ESG goals (Low, Montella, & Schaafsma, 2023).

4.5.3 Industrial practitioners' cognitive perceptions on ESG are generally higher than the organisational practice

The findings from section 4.4.1, 4.4.2 and 4.4.4 reveals that industrial practitioners in the construction supply chain have a cognitive perception of ESG practices higher than the organisational practices. This observation aligns with the findings presented in the literature review section 2.2. This is demonstrated by clearly defining organisational practices and cognitive perceptions and exploring the mutual relationship between these two concepts. Additionally, under section 2.7, the ESG practices statements derived from a study of listed construction companies on the Kuala Lumpur Stock Exchange (KLSE) reveal a greater volume of ESG-related statements than those found in the literature review. This indicates a more extensive engagement with ESG issues among these companies compared to the general discussions in the literature review.

4.5.4 Property development excel in ESG practices among all different nature of business activities

The findings from section 4.4.1 reveals that property development (mean= 4.03) excel in implementing ESG practices especially on green initiatives and biodiversity and ecology. This aligns with the literature review in section 2.8, where Jia (2022) stated that property developers are key from start to finish of a project, managing planning, design, and financing. They commit to ESG by using sustainable materials and energy-saving designs to achieve environmental certifications like GBI, thus lessening their environmental impact. Socially, they engage with communities to address concerns, ensure affordable housing, and enhance local infrastructure. For governance, they focus on being transparent, adhering to regulations, and upholding high ethical standards.

4.5.5 Builder merchants demonstrate the highest level of awareness regarding the importance of ESG practices

The results from section 4.4.2 indicate that builder merchants (mean= 4.60) exhibit the greatest level of awareness regarding the importance of ESG practices especially on energy management and biodiversity and ecology. This supports the literature reviews in section 2.8 mentioned by Grant, Stone and Jennie (2022) that builder merchants are crucial in making the construction supply chain more sustainable. They supply eco-friendly materials and tools, work to reduce carbon emissions through better logistics, and follow ethical buying practices. Socially, they check that their suppliers treat workers fairly and sometimes take part in community programs. In terms of governance, they follow supply chain laws and keep their operations transparent.

4.5.6 ESG integration within the Malaysian construction supply chain

The findings from section 4.4.5 outline potential strategies for ESG integration within Malaysian construction supply chain organisations. The most commonly suggested strategy by respondents was “Optimising Taxation and Incentives” (n=11), followed by “Revise the National Sustainability Policy” (n=9), “Conduct ESG training sessions for employees” (n=7), and “Ensure a solid

grasp of ESG Principles" (n=6). This aligns with the literature review in sections 2.6, where Low, Montella, and Schaafsma (2023) emphasised the importance of upskilling employees through training to enhance their understanding of ESG principles. This is further supported by the literature review in section 2.7, where the environmental consideration highlights "Education and Awareness" and the social consideration emphasises "Employee Training and Development." These points are consistent with the findings presented in section 4.4.5.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In summary, the overall implementation of ESG practices within the Malaysian construction supply chain is notably above average. Detailed explanations supporting this conclusion are provided in Section 5.2, while Section 5.3 of this research report examines the implications of the findings for the construction industry, regulatory bodies, and academic circles, highlighting points of interest for these groups. Section 5.4 outlines the limitations of this study. Consequently, Section 5.5 presents recommendations for future research on related topics.

5.2 Accomplishment on Research Aims and Objectives

In summary, the successful achievement of the research's aims and objectives can be demonstrated through the following rationale:

Research Objectives 1: To explore the organisational practices of ESG

The three key components namely Environmental, Social, and Governance (ESG) that define ESG practices in the construction supply chain organisation have been identified through literature reviews, official documents, and company annual reports. A total of 22 ESG statements has been discovered, six statements from Environmental aspects and eight statements each from Social and Governance aspects. The affinity diagrams and table below concludes the whole findings on the organisational practices of ESG in this research.

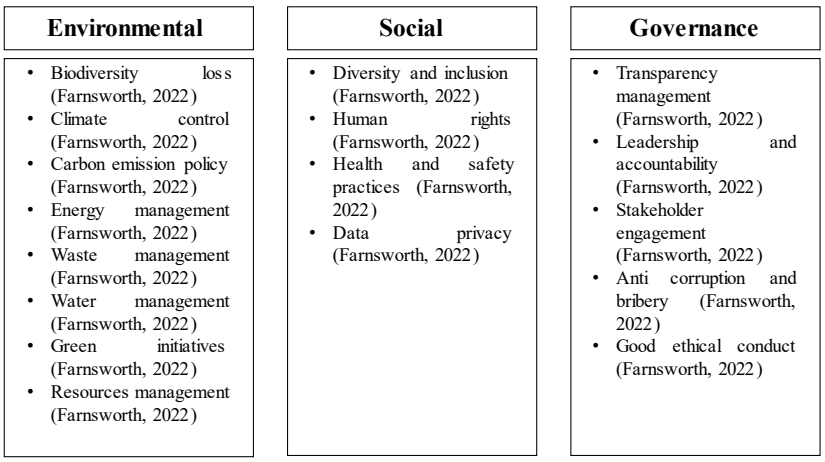

Figure 5.1: Affinity diagram of ESG

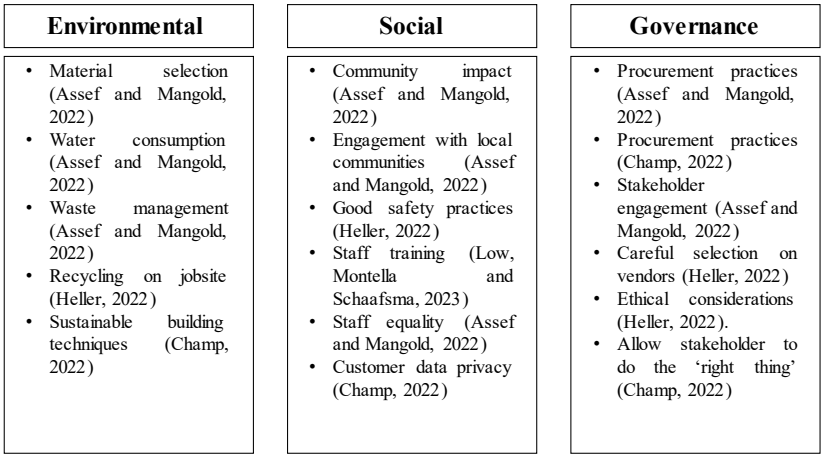

Figure 5.2: Affinity diagram of ESG in Construction Industry

Table 5.1: ESG in Malaysia construction companies

Environmental	Social	Governance
• Environmental management (34) • Energy management (22) • Green initiatives (6) • Digitalisation (3)	• Employee training and development (27) • Diversity and equality (26) • Employee benefits (26)	• Stakeholder engagement (31) • Anti-corruption and bribery (22) • Code of conduct and ethics (22)

• Material consumption (3) • Biodiversity and ecology (2) • Education and awareness (1)	• Health and safety (23) • Community engagement (14) • Customer data privacy (3) • Customer satisfaction (1)	• Sustainability governance (12) • Procurement practices (4) • Supply chain management (4) • Materiality assessment (3) • Transparency (2)

Research Objectives 2: To examine the common practices related with ESG in the organisations of Malaysian construction supply chain

The results of the comprehensive analysis of 40 listed companies' annual reports from Kuala Lumpur Stock Exchange (KLSE) are tabulated into Table 2.3. A total of 22 ESG activities have been identified from global frameworks. The findings indicate that property developers exhibit the highest level of ESG organisational practices within the Malaysian construction supply chain. Conversely, builder merchants show a higher cognitive perception of ESG practice compared to their organisational practice. Overall, industrial practitioners exhibit a stronger cognitive perception of ESG practices compared to the actual organisational practice implemented.

Research Objectives 3: To identify the potentials strategies in the integration of ESG and practices of Malaysian construction supply chain.

Overall, construction companies within the Malaysian construction supply chain have been incorporating ESG practices into their operations. However, it is noteworthy that while the Malaysian construction supply chain demonstrates a stronger cognitive perception of ESG practices, there is room for improvement in organisational practice implementation. Therefore, industrial practitioners must prioritise the implementation of ESG practices over merely possessing a strong cognitive perception. The potential strategies identified in this report include optimising taxation and incentives, revising the national sustainability policy, and conducting ESG training sessions for employees to ensure a solid foundation of ESG principles within the company. This ensures alignment with

ESG goals and the effective integration of sustainable practices into company activities.

Research Aims: To examine the Environmental, Social and Governance (ESG) practices in construction supply chain organisations of Malaysian companies

The study of Environmental, Social, and Governance (ESG) practices was conducted using the annual reports of listed construction companies. The attributes of the respondents were utilised to examine the organisational practice of ESG and cognitive perceptions. Finally, the findings were applied to explore potential strategies for integrating ESG practices. Figure 5.1 summarises the outcomes of this research paper.

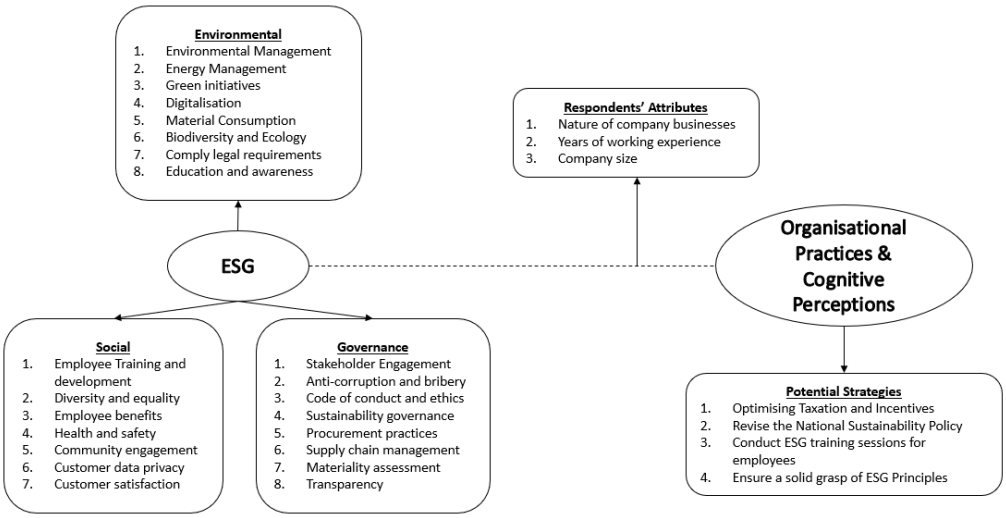

Figure 5.3: Organisational Practices and Cognitive Perceptions in Malaysian Construction Supply Chain Organisation

5.3 Research Implication

The research implication to the industry, governing bodies and research or academic communities are outlined as follows respectively:

(a) Industry

The research findings act as an urgent prompt for construction organisations to adopt ESG practices that clearly benefit their operations. This information can

be leveraged to devise strategies that enhance the implementation of ESG practices. For instance, companies could initiate training sessions for the ESG team to deepen their understanding of ESG principles within the organisation. The research findings can serve as a blueprint for professional bodies looking to integrate ESG practices. The findings provide distinct guidelines for implementation. It's noteworthy that merchants, consultants and contractors need to ensure the thorough incorporation of ESG practices, whereas property developers can further enhance their organisational standards accordingly.

(b) Governing bodies

The research findings offer important references and insights for regulators to refine policies that facilitate the successful adoption of the i-ESG framework as outlined in the Missions of the New Industrial Master Plan 2030. Moreover, the results assist regulators in pinpointing key obstacles that hinder organisations from fully integrating ESG practices. For example, financial barriers are a significant challenge; therefore, regulators could offer incentives such as tax reductions or direct financial support to help organisations implement ESG practices. Lastly, regulators might also consider refining the national sustainability policy to further support these initiatives.

(c) Research or academic communities

The research findings provide valuable insights for researchers and academics into organisational practices, cognitive perceptions, and strategies related to ESG integration within the Malaysian construction supply chain. This information aids researchers in understanding the current trends of ESG practices within this sector and enables them to devise innovative strategies for ESG implementation. Additionally, these insights can facilitate further research on the subject and assist in the development of new tools and resources to help organisations enhance their ESG practices.

5.4 Research Limitations

The first limitation identified in this research paper concerns the results of the Friedman Test regarding the impact of ESG practices on organisational

performance, as presented in section 4.4.3, which are not statistically significant. Additionally, the research focuses primarily on individual perspectives, which may not fully represent the broader organisational view. Furthermore, while most results adhere to the requirements of the Central Limit Theorem, certain subsets of data, such as responses from "merchants" and those with over ten years of work experience, include fewer than 30 respondents, potentially affecting the robustness of the findings. Finally, because of cultural and socioeconomic differences, responses from construction practitioners in Malaysia that form the basis of this study may not be the same as those from practitioners in other nations. Therefore, caution should be exercised when extrapolating these findings to other international situations.

5.5 Research Recommendations

The research suggests several recommendations to improve the breadth and validity for future research. Firstly, it is advised to delve deeper into the potential strategies identified under section 4.5.6 in this research, which are primarily based on respondents' suggestions. To strengthen these recommendations, it is proposed to incorporate additional surveys in this section to facilitate hypothesis testing and to revise the research approach to include a company-wide perspective for a more holistic analysis of the data. Secondly, for future studies to achieve greater thoroughness and reliability, it is essential to clearly specify the unit of analysis, which is to focus on organisations instead of individuals. Restructuring demographic data and increasing responses from underrepresented groups can overcome limitations related to sample size, allowing for more robust statistical analysis and enabling more relevant comparisons across various demographics. Lastly, exploring the transferability of the findings beyond Malaysia in future research endeavours would broaden the study's scope and facilitate broader generalisation of the results.

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APPENDICES

Appendix A: Questionnaire

ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) PRACTICES IN CONSTRUCTION SUPPLY CHAIN ORGANISATIONS: A COMPARISON OF ORGANISATIONAL PRACTICES AND COGNITIVE PERCEPTIONS OF INDUSTRIAL PRACTITIONERS

Dear Sir/Madam,

I am Chong Zhi Loong, final year student from Universiti Tunku Abdul Rahman (UTAR) Sungai Long Campus undertaking the course on Bachelor of Science (Honours) Quantity Surveying. Currently, I am working on my Final Year Project entitled "Environmental, Social and Governance (ESG) Practices in Construction Supply Chain Organisations: A Comparison of Organisational Practices and Cognitive Perceptions of Industrial Practitioners". The objective of this research is to explore the organisational practices of ESG, to examine the common practices related with ESG in the organisations of Malaysian construction supply chain and to identify the potentials strategies in the integration of ESG and practices of Malaysian construction supply chain.

The questionnaire consists of (3) sections:
Section A: Close-ended Questions
Section B: Open-ended Questions
Section C: Demographic Background

This survey will take approximately 5 to 10 minutes to complete. Please be assured that there will be no attempts to disclose your identity throughout this study. All the data will be used purely for academic purpose and will be strictly anonymous.

I believe that your relevant experience and expertise in construction industry are useful for this research. Your contribution in this survey will be significant for the project and will stimulate the development of construction industry. Please do not feel hesitate to contact me at zhiloong00@1utar.my if you have any queries about this survey.

Thank you for your participation and time.

Faithfully,

Chong Zhi Loong

Section A: Closed-ended Questions

1) To what extent your company practices the following?

[1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always]

Ref. code	Statements	1	2	3	4	5
A1_1	Environmental Management	1	2	3	4	5
A1_2	Energy Management	1	2	3	4	5
A1_3	Green Initiatives	1	2	3	4	5
A1_4	Digitalisation	1	2	3	4	5
A1_5	Material Consumption	1	2	3	4	5
A1_6	Biodiversity and Ecology	1	2	3	4	5
A1_7	Education and Awareness	1	2	3	4	5
A1_8	Employee Training and Development	1	2	3	4	5
A1_9	Diversity and Equality	1	2	3	4	5
A1_10	Employee Benefits	1	2	3	4	5
A1_11	Health and Safety	1	2	3	4	5
A1_12	Community Engagement	1	2	3	4	5
A1_13	Customer Data Privacy	1	2	3	4	5
A1_14	Customer Satisfaction	1	2	3	4	5
A1_15	Stakeholder Engagement	1	2	3	4	5
A1_16	Anti-corruption and Bribery	1	2	3	4	5
A1_17	Code of Conduct and Ethics	1	2	3	4	5
A1_18	Sustainability Governance	1	2	3	4	5
A1_19	Procurement Practices	1	2	3	4	5
A1_20	Supply Chain Management	1	2	3	4	5
A1_21	Materiality Assessment	1	2	3	4	5
A1_22	Transparency	1	2	3	4	5

2) To what extent do you agree that the following are important to an organisation?

[1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree]

Ref. code	Statements	1	2	3	4	5
A2_1	Environmental Management	1	2	3	4	5
A2_2	Energy Management	1	2	3	4	5
A2_3	Green Initiatives	1	2	3	4	5
A2_4	Digitalisation	1	2	3	4	5
A2_5	Material Consumption	1	2	3	4	5
A2_6	Biodiversity and Ecology	1	2	3	4	5
A2_7	Education and Awareness	1	2	3	4	5
A2_8	Employee Training and Development	1	2	3	4	5
A2_9	Diversity and Equality	1	2	3	4	5
A2_10	Employee Benefits	1	2	3	4	5
A2_11	Health and Safety	1	2	3	4	5
A2_12	Community Engagement	1	2	3	4	5
A2_13	Customer Data Privacy	1	2	3	4	5
A2_14	Customer Satisfaction	1	2	3	4	5
A2_15	Stakeholder Engagement	1	2	3	4	5
A2_16	Anti-corruption and Bribery	1	2	3	4	5
A2_17	Code of Conduct and Ethics	1	2	3	4	5
A2_18	Sustainability Governance	1	2	3	4	5
A2_19	Procurement Practices	1	2	3	4	5
A2_20	Supply Chain Management	1	2	3	4	5
A2_21	Materiality Assessment	1	2	3	4	5
A2_22	Transparency	1	2	3	4	5

3) To what extent do you agree that ESG impacts the following aspects of organisational performance?

[1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree]

Ref. code	Statements	1	2	3	4	5
A3_1	Financial Performance	1	2	3	4	5
A3_2	Risk Mitigation	1	2	3	4	5
A3_3	Innovation and Competitiveness	1	2	3	4	5
A3_4	Talent Management	1	2	3	4	5
A3_5	Reputation	1	2	3	4	5
A3_6	Access to Capital	1	2	3	4	5
A3_7	Legal and Regulatory Compliance	1	2	3	4	5
A3_8	Social and Environmental Impact	1	2	3	4	5
A3_9	Supply Chain Relationships	1	2	3	4	5
A3_10	Investor and Consumer Confidence	1	2	3	4	5

Section B: Open ended Questions

1) Does your organisation have a formal ESG in place?
[Please indicate Yes/No]

2) Does your organisation have a dedicated ESG team?
[Please indicate Yes/No]

3) What other advice would you suggest for integrating ESG principles into the construction supply chain?

4) What is your vision for the opportunities and challenges of ESG in the construction industry?

Section C: Demographic Background

1) What is your company's main business activity? *

- Property Development
- Construction Business
- Consultancy Services
- Materials/Equipment/Machinery Tradings
- Other: _____

2) How long have you been working in the construction industry? *

- Less than 5 years
- 6 – 10 years
- 11 – 15 years
- More than 15 years

3) What is your company size?

- Micro
- Small
- Medium
- Large

4) What is the number of employees in you company?

- Less than 5
- 5 to less than 75
- 75 to less than or equal to 200
- More than 200

5) What is your company's sales turnover(MYR)?

- Less than RM300,000
- RM300,000 to less than RM15 mil
- RM15 mil to less than or equal to RM50 mil
- More than RM50 mil

Consent of Participation

By clicking submit of the online questionnaire, you are indicating that:

1) You understand that if you have any additional questions, you can contact zhiloong00@1utar.my.

2) You understand that Privacy Notice of UTAR is available at https://www2.utar.edu.my/PrivacyNotice_English.jsp

3) You understand that you can contact the Research Ethics Officers at +603 9086 0288 or aswini@utar.edu.my.

4) You agree to participate in this survey voluntarily.

Appendix B: ESG in Malaysia construction companies

Listed Company	Environmental	Social	Governance
ADVANCECON HOLDINGS BERHAD	• Waste disposal • Environmental management system	• Employee diversity • Human capacity • Social contributions • Health and safety risk management	• Engaging stakeholder • Corporate governance and ethics • Materiality assessment
AME ELITE CONSORTIUM BERHAD	• Waste and materials management • Commitment to 3R (Recycle, Reuse and Reduce) • Cloud base waste and recycling management system • Energy management	• Human rights • Developing, retaining, and attracting talent • Employee benefits • Diversity and equality • Employee engagement • Employee communities • Health and safety risk management	• ssssssStakeholder engagement • Sustainability governance • Supply chain management • Materiality assessment

ANEKA JARINGAN HOLDINGS BERHAD	• Energy management • Waste management • Water conservation • Ground vibration and noise management	• Equality, diversity, and inclusion • Rewarding our people • Respect human rights • Protect foreign workers • Training and development • Health and safety risk management	• Stakeholder engagement • Supply chain sustainability
AHMAD ZAKI RESOURCES BERHAD	• Energy management and efficiency • Protecting biodiversity • Water conservation • Material management • Green building programmes • Sustainable office programme	• Diversity, inclusivity, and social justice • Workforce diversity, equal rights and reduce discrimination • Local employment • Staff welfare • Human rights	• Sustainability governance • Stakeholder engagement • Supply chain management

		• Health and safety risk management • Training and career development	
BINA PURI HOLDINGS BHD	• Energy management • Reduce carbon footprint	• Staff benefits • Employee welfare	• Code of conduct and ethics • Anti-corruption and bribery • Stakeholder engagement
CREST BUILDER HOLDINGS BERHAD	• Energy and water saving • Waste and effluent • Climate-related risks and opportunities	• Safe workplace • Training and talent management • Diversity • Labour practices • Community engagement	• Code of conduct and ethics • Anti-corruption and bribery • Stakeholder engagement
DKLS INDUSTRIES BHD	• Waste management • Energy and water conservation	• Workplace and talent management • Diversity and equality	• Stakeholder engagement • Materiality assessment • Anti-corruption

		• Employee and community engagement • Welfare and benefits • Health and safety	• Procurement and supply chain management
ECONPILE HOLDINGS BERHAD	• Air quality monitoring • Noise monitoring • Water discharge monitoring	• Health and safety • Diversity and equal opportunity • Employee benefits • Employee engagement	• Stakeholder engagement • Governance transparency • Procurement practices and subcontractor management
EKOVEST BERHAD	• Reducing, reusing, and recycling waste • Noise monitoring	• Diversity and inclusiveness • Flood relief • Employee training	• Stakeholder engagement • Ethical business conduct, corporate integrity and anti-corruption and bribery
GAMUDA BERHAD	• Carbon reduction via green mobility • Green spaces • Water conservation	• Human rights policy • Diversity and inclusion policy • Gifts and benefits policy	• Stakeholder engagement • Code of business ethics • Anti-corruption practices

	• Reducing waste • Renewable energy		
GDB HOLDINGS BERHAD	• Waste, effluent, and resource management • Reduce pollution	• Awareness and training • Diversity and inclusivity • Human capital development • Human rights	• Ethics and governance • Sustainability risk management • Stakeholder engagement
HAILY GROUP BERHAD	• Reduce wastage • Comply legal requirements • Prevent pollution	• Proper development and utilisation of human resources	• Sustainability governance
HO HUP CONSTRUCTION COMPANY BHD	• Noise management • Effluent and waste management • Green nature indoors and outdoors • Dust emission	• Health and safety • Learning and development • Inclusion, diversity, and talent • Community engagement	• Stakeholder engagement

INFRAHARTA HOLDINGS BERHAD	• Emission monitoring • Waste and effluent • Water/energy conservation	• Diversity • Health and safety	• Ethical standard • Anti-bribery and corruption
IJM CORPORATION BERHAD	• Enhance climate strategy • Pursue green credentials	• Enhance human rights practices • Elevate culture and capabilities	• Stakeholder engagement • Sustainability governance
KERJAYA PROSPEK GROUP BERHAD	• Environmental management • Energy and emissions management • Resource, waste, and pollutions management • Water management	• Ethics and integrity • Customer data and privacy • Labour practices and human rights • People and diversity • Talent attraction, retention, and development • Health and safety	• Sustainable development • Governance framework • Stakeholder engagement • Supply chain management

LEBTECH BERHAD	• Noise management • Reduce open burning • Energy conservation	• Safe and healthy working place • Company activities • Employee benefits	• Governance framework
MGB BERHAD	• Energy consumption • Climate change and emissions • Water consumption • Waste management • Material consumption	• Talent management • Hiring and retention • Employee benefits • Employee engagement • Human rights	• Code of conduct and ethics • Anti-corruption and bribery • Stakeholder engagement
MUDAJAYA GROUP BERHAD	• Waste management • Energy conservation	• Diversity and inclusion • Occupational health and safety • Training and development	• Stakeholder engagement • Sustainability roadmap
OCR GROUP BERHAD	• Green initiatives	• Customer satisfaction • Occupational health and safety • Diversity and inclusiveness	• Stakeholder engagement • Code of conduct and ethics • Anti-corruption and bribery

		• Skill development	
PROTASCO BERHAD	• Water, energy, and materials management • Waste and effluent management	• Labour practices • Occupational health and safety • Employee benefits	• Code of conduct and ethics • Anti-corruption and bribery Procurement practices • Stakeholder engagement
PESONA METRO HOLDINGS BERHAD	• Education and awareness programme • Green 5S practices • Material management • Waste management	• Human rights • Employee recognition awards • Training and development • Employee benefits and welfare	• Stakeholder engagement • Transparent market practices
PINTARAS JAYA BHD	• Waste management	• Occupational health and safety • Employee development • Community caring	• Stakeholder engagement • Code of conduct and ethics • Anti-corruption and bribery
PUNCAK NIAGA HOLDINGS BERHAD	• Energy, noise, water, and waste management	• Engaging with employee • Employee performance review • Community engagement	• Stakeholder engagement • Code of conduct and ethics • Anti-corruption and bribery

	• Improving operational efficiency with digitalisation		
SC ESTATE BUILDER BERHAD	• Proper waste management • Reuse and recycle of material or equipment • Environmental friendly materials	• Workplace diversity • Health and safety working environment	• Corporate governance • Code of conduct and ethics • Anti-corruption and bribery
EVERSENDAI CORPORATION BERHAD	• Water, air, greenery and energy conservation	• Community and employee engagement • Health and safety • Employee benefits	• Code of conduct and ethics • Anti-corruption and bribery • Stakeholder engagement • Sustainability governance
SIAB HOLDINGS BERHAD	• Energy consumption • Waste management • Water consumption	• Diversity and inclusion • Occupational health and safety • Community engagement • Data privacy protection	• Stakeholder engagement • Code of conduct and ethics • Anti-corruption and bribery

SUNWAY CONSTRUCTION GROUP BERHAD	• Climate action • Protection of biodiversity and ecology • Pollution management	• Value chain improvement • Employee well-being • Human rights • Community investment	• Group standards and operating procedure • Innovation and technology
TCS GROUP HOLDINGS BERHAD	• Waste management • Energy consumption	• Occupational health and safety • Training and development • Community engagement	• Code of conduct and ethics • Anti-corruption and bribery
VESTLAND BERHAD	• Utilisation of formwork system • Digitalisation	• Diversity and inclusion • Compensation and benefits • Human and labour rights • Safety and supervision	• Stakeholder engagement • Code of conduct and ethics • Anti-corruption and bribery
WCT HOLDINGS BERHAD	• Climate change and emissions • Sustainable mobility • Digitalisation • Waste management • Energy consumption	• Community engagement • Data privacy • Talent management • Training • Employee benefits • Employee engagement	• Stakeholder engagement • Code of conduct and ethics • Anti-corruption and bribery

	• Water conservation		
WIDAD GROUP BERHAD	• Pollution and waste management	• Diversity and inclusion • Compensation and benefits • Community engagement	• Stakeholder engagement • Code of conduct and ethics • Anti-corruption and bribery
ZELAN BERHAD	• Pollution control • Air, water, and noise monitoring	• Health and safety • Employee well-being • Learning and development	• Code of conduct and ethics • Anti-corruption and bribery • Stakeholder engagement
ZECON BERHAD	• Energy consumption and emission management • Water conservation	• Talent management and labour practices	• Stakeholder engagement • Code of conduct and ethics • Anti-corruption and bribery
GADANG HOLDING BERHAD	• Waste, energy, and environmental management • Climate change	• Health and safety • Community development • Attractive and inclusive workplace	• Stakeholder engagement
GABUNGAN AQRS BERHAD	• Climate change • Pollution management	• Talent management • Employee benefits	• Stakeholder engagement • Code of conduct and ethics

	• Waste management • Energy management • Water conservation	• Human rights • Diversity and inclusivity	• Anti-corruption and bribery
TUJU SETIA BERHAD	• Noise management • Water and air monitoring • Waste management • Energy saving practice	• Diversity and equal opportunity • Workplace safety • Training and education	• Stakeholder engagement • Code of conduct and ethics • Anti-corruption and bribery

Appendix C: Friedman Test on ESG Practices in the Malaysian Construction Supply Chain Organisation

Ref. code	Statements	Mean Rank	Chi-square	Asymp. Sig.
Environmental			73.093	<0.001
A1_1	Environmental Management	10.79		
A1_2	Energy Management	11.57		
A1_3	Green Initiatives	10.82		
A1_4	Digitalisation	11.48		
A1_5	Material Consumption	11.08		
A1_6	Biodiversity and Ecology	9.97		
Social				
A1_7	Education and Awareness	10.91		
A1_8	Employee Training and Development	11.60		
A1_9	Diversity and Equality	11.11		
A1_10	Employee Benefits	11.05		
A1_11	Health and Safety	11.86		
A1_12	Community Engagement	10.85		
A1_13	Customer Data Privacy	11.61		
A1_14	Customer Satisfaction	12.22		
Governance				
A1_15	Stakeholder Engagement	11.94		
A1_16	Anti-corruption and Bribery	12.30		
A1_17	Code of Conduct and Ethics	12.49		
A1_18	Sustainability Governance	11.98		
A1_19	Procurement Practices	12.80		
A1_20	Supply Chain Management	11.59		
A1_21	Materiality Assessment	11.34		
A1_22	Transparency	11.65		

Appendix D: Friedman Test on Cognitive Perceptions on ESG Practice in the Malaysian Construction Supply Chain Organisation

Ref. code	Statements	Mean Rank	Chi-square	Asymp. Sig.
Environmental			84.004	<0.001
A2_1	Environmental Management	10.37		
A2_2	Energy Management	10.68		
A2_3	Green Initiatives	11.04		
A2_4	Digitalisation	12.24		
A2_5	Material Consumption	11.03		
A2_6	Biodiversity and Ecology	10.63		
Social				
A2_7	Education and Awareness	11.71		
A2_8	Employee Training and Development	12.28		
A2_9	Diversity and Equality	11.35		
A2_10	Employee Benefits	12.55		
A2_11	Health and Safety	12.04		
A2_12	Community Engagement	11.17		
A2_13	Customer Data Privacy	12.00		
A2_14	Customer Satisfaction	12.23		
Governance				
A2_15	Stakeholder Engagement	11.85		
A2_16	Anti-corruption and Bribery	11.68		
A2_17	Code of Conduct and Ethics	11.78		
A2_18	Sustainability Governance	11.43		
A2_19	Procurement Practices	11.27		
A2_20	Supply Chain Management	10.68		
A2_21	Materiality Assessment	11.21		
A2_22	Transparency	11.80		

Appendix E: Friedman Test on ESG Practice Impacts on organisational performance in the Malaysian Construction Supply Chain Organisation

Ref. code	Statements	Mean Rank	Chi-square	Asymp. Sig.
A3_1	Financial Performance	5.28	13.239	0.152
A3_2	Risk Mitigation	5.32		
A3_3	Innovation and Competitiveness	5.71		
A3_4	Talent Management	5.54		
A3_5	Reputation	5.70		
A3_6	Access to Capital	5.49		
A3_7	Legal and Regulatory Compliance	5.70		
A3_8	Social and Environmental Impact	5.46		
A3_9	Supply Chain Relationships	5.30		
A3_10	Investor and Consumer Confidence	5.49		