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# A Study on Implementing Green Practices in Business Organization in Sri Lanka

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## **Abstract-**

**Purpose:** This research evaluates the implementation of green practice at manufacturing companies to minimize operational waste and carbon emissions in Sri Lanka. It focuses on how four green practices that are used by Hayleys PLC reduce reuse recycle and repair function for both carbon footprint control and waste reduction.

**Methodology:** This research used structured surveys, distributed to 196 employees selected from stratified random sampling as part of its quantitative methodology. Statistical data analysis was conducted through multiple regression testing with correlation to investigate how green practices influence carbon footprint management.

**Findings:** The research results show that carbon footprint management benefits significantly through all four green practices. Reuse generates the most influence among participants, followed by repair, then reduction, and lastly, recycling. The analyzed green practices explain an immense of the variation observed in carbon footprint management. The results establish why organisations must use comprehensive methods when addressing sustainability needs. Practical benefits emerge from this research to guide organizations that seek better environmental performance while maintaining operational efficiency.

**Implications:** Green practices must be intensified with policy backing so they can properly connect with business operational plans. The study provides empirical evidence that adds to academic understanding of sustainability initiatives in developing countries. The investigation focused on one organization and used participant-reported data, so future studies should analyze extended effects across multiple industries while using objective performance indicators.

**Keywords:** Green Practices; Carbon Footprint; Waste Reduction; Sustainability

## I. INTRODUCTION

This study focuses on the application of green practices in business organization in Sri Lanka. The consumers expectation on greener products has been triggered.

At early period, enterprises concentrated solely on increasing output with cost cutting and maximizing profitability, regularly neglecting the environmental repercussions of their activities. It creates harmful refuse generation and carbon emissions to the environment. These environmental hazards highlighted the necessity for organizations to embrace practices regarding ecological footprint and contribute to environmental preservation. At this junction, the idea of green operations was born, focusing on sustainable environmentally friendly practices without compromising the operational efficiency. The manufacturing organizations have to formulate their business strategies in line with global climate change issues for achieving sustainable development goals (United Nations, 2015). Every organization worldwide is realizing the importance of green practices in its operations, driven by the ever-increasing awareness of environmental sustainability. These practices such as minimizing waste generation, reducing carbon emissions, and maximizing resource use, can take some time to align business strategies with global efforts to mitigate climate change and achieve the sustainable development goals (United Nations, 2015). This eco-friendly concept shows strict regulations as well as financial benefits through resource efficiency (Chiarini, 2020).

The green practices concept has come to the forefront in the business sectors in Sri Lanka. Government and private sector organizations in Sri Lanka have commenced to emphasis on sustainable practices because the acute susceptibility of the country to climate change and environmental degradation (Ministry of Environment, 2021).



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The broader aim of these green practices is to enhance operational efficiencies in the waste through designing resource efficient, energy efficient and environmentally sound waste handling approaches. This has increasingly become a priority for the government as well as for private sector organizations in Sri Lanka due to climatic and environmental vulnerabilities faced by the country (Ministry of Environment, 2021).

Hayleys PLC which is one of the largest conglomerates in Sri Lanka has been a proactive company in terms of sustainability reporting. Based on the business diversification, Hayleys has incorporated green practices as an important aspect of its business strategies across sectors including agriculture, manufacturing, transportation and consumer goods. Waste management programs, energy efficient manufacturing and carbon footprint reduction projects are some of the measures that Hayleys has taken to support sustainability (Hayleys PLC Annual Report, 2023). Hayleys company reported a 25% reduction in energy consumption per production unit and a 15% reduction in its overall carbon footprint since 2020 (Hayleys Sustainability Report 2023).

According to the year 2022, Hayleys company efforts also serve the global environmental agendas while enhancing the company's competitive edge and brand image. Besides, lack of opportunities to access sustainable technologies, expensive initial investment and reluctance to change are some of the challenges that organizations face (Zailani et al., 2012).

Despite the increasing uptake of green practices, there are number of challenges which affect their proper implementation in organizational operations. Also, tracking the effects of these measures and the difficulty of implementing them throughout the different business units of an organization are some of the challenges encountered. For a conglomerate like Hayleys PLC which has operations in various sectors of the economy with different environmental impacts, a holistic approach to sustainability is crucial.

This study focuses on the application of green practices in organizational operations with emphasis on Hayleys PLC. It aims at identifying the factors that have shaped the adoption of the emissions practices, and the extent barriers of encountered practice in the reducing implementation. Through waste and the carbon analysis of Hayleys PLC's sustainability initiatives, research objectives to provide practical suggestions to help other organizations improve their environmental performance without compromising their operational effectiveness. The results may also be useful in the understanding of sustainable business strategies in Sri Lanka and other countries, and to encourage the formation of policies and standards that will support green management systems.

## II. LITERATURE REVIEW

The literature review synthesizes empirical and theoretical literature on the implementation of GPs to reduce waste and carbon footprint (CF) in the operations of organization in Sri Lanka, specially, focus on Hayleys PLC, for its sustainability initiatives.

Empirical studies on waste reduction strategies such as recycling, lean manufacturing, and closed-loop systems are critically examined to highlight their effectiveness in minimizing landfill dependency and conserving raw materials. Similarly, practices aimed at reducing CF, such as renewable energy adoption, carbon offsetting, and energy-efficient technologies, are analyzed for their potential to decouple economic growth from environmental harm.

## III. EMPIRICAL THEORY

Organizational sustainability and Green Practices

Numerous studies have confirmed that employing green practices leads to lower environmental degradation, while simultaneously providing the company with improved operational productivity. Hart and Dowell (2011) showed that companies employing aggressive environmental policies, such as energy efficient and waste recycling, were able to save costs and strengthen their positions in the market. In another instance, De Giovanni (2020) was able to show that European manufacturing firms were able to lower their industrial waste by 30 – 50% due to the incorporation of circular economy models which involved recycling and material reusing.

Agyabeng-Mensah et al. (2020) found evidence of green supply chain management lean manufacturing being the most common practices for achieving sustainability in African and Asian regions. According to their research, coupling lean techniques (such as overconsumption of resources) with the use of renewable energy achieved a 25% reduction of carbon emission in textile companies. This is akin to Hayleys plantation solar energy powered lean agriculture practices that aim at saving water and fertilizer.

Reduction Strategies for Carbon Footprints

The use of renewable resources continues to be a key component in the efforts towards carbon neutrality goals. Hussain et al. (2022) carried out a study on 200 firms worldwide and reported that investments in wind and solar energy by these firms resulted in 40% reduction of Scope 1 and 2 emissions over five years. Hayleys PLC's solar energy usage in its manufacturing facilities in Sri Lanka, such as its 1.2 MW solar plant in the Dipped Products facility, allows the company to decrease fossil fuel usage by 15% every year which is in line with these findings.



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Fargione et al. (2018) showed that reforestation projects were able to sequester an average of 5-11 tons of CO<sub>2</sub> per hectare annually as a result of farming. This is a strategy which Hayleys undertakes its "Earth Lung" project which planted 2.5 million trees in Sri Lanka. Nonetheless, Wynes et al. (2021) argue that offsetting emissions has to be an addition to direct emission reduction policies, which clearly illustrates the benefit of trying a combination of approaches in case of Hayleys. They use offsets alongside energy audits and changes in technology and processes.

### IV. DECREASING THE OVERALL CARBON EMISSION LEVELS

Wynes et al. (2021) warn that offsetting emissions is only beneficial when it is a supplement to other emission reduction strategies, reinforcing the point of needing blended approaches like those of Hayleys well, which do not only set offsets but conduct energy audits and redesign the processes.

Silvestre and Țircă (2019). Second, limited number of studies have tried to quantify the economic returns from green practices, especially in volatile markets which can again be achieved by considering Hayleys' 22% revenue growth target from eco-friendly product lines slated for (2020-2023).

### V. USAGE OF GREEN OPERATION PRACTICES

Green operation practices are a set of practices in which environmental responsibility is integrated into the organizational practices, for reducing wastage, minimizing use of resources and carbon emissions.

Waste valorization is a process to transform by-products into valuable resources which is coherent with the circular economy principles. Hayleys re-purposes agricultural waste (e.g., coconut husks) into coir-based products, earning \$8 million annually and diverting 12,000 tons of waste from landfills (Chertow & Park, 2016).

Closed-Loop Manufacturing: The firm's textile arm recycles 90% of dye wastewater using reverse osmosis systems—reducing freshwater dependency by over 35% (Hayleys, 2023).

Low-Emissions Logistics The company's logistics subsidiary, Hayleys Adventist, applies route optimization software and hybrid vehicles which leads to a 22% fuel reduction (Agyabeng-Mensah et al., 2020).

#### Employee Engagement and Green Culture

Workforce involvement is vital for the perpetuation of green practices. Hayleys' "Green Teams" train employees in waste segregation and energy conservation resulting in a 25% increase in compliance (Paillé et al., 2014).

Hayleys employs IoT sensors in its packaging plants to minimize the energy, by reducing the idle-time consumption up to 12%. By smart sensors.

Within its agriculture sector, it is using blockchain technology for traceability of sustainable palm oil sourcing which resulted in increasing legitimacy and transparency (Khan et al., 2021).

#### Challenges in Implementation

High Initial Costs: Hayleys' solar transition required \$4.2 million upfront, partially offset by World Bank green financing.

Regulatory Fragmentation: Inconsistent policies across Sri Lanka's provinces complicate compliance (Khan et al., 2021).

Cultural Resistance: Employee resistance was managed through phased training and leadership advocacy (Linnenluecke et al., 2013).

Hayleys PLC illustrates the potential for GOPs to link profit making with improving planetary health. The hybrid nature of its strategy, using technology, circularity, and stakeholder engagement, validates existing academic theories and tackles challenges faced by emerging markets. Its revenue of 22% expected from eco-products (2020–2023) demonstrated that green transformation is financially appealing for an MNE, providing a suitable blueprint.

Proactive Environmental Strategy: A forward-thinking approach that embeds sustainability into core business goals rather than treating it as a compliance requirement. Hart and Dowell (2011) emphasize that proactive firms align environmental goals with long-term competitiveness. -The "Hayleys Life" framework integrates carbon neutrality, zero waste-to-landfill, and resource efficiency across all 12 business sectors.

Circular Economy Integration: Transitioning from a linear "take-make-dispose" model to closed-loop systems that reuse, recycle, or repurpose waste. Hayleys use Coconut husks from its agriculture division are converted into coir-based products (mats, ropes), diverting 95% of waste from landfills.

Sustainable Supply Chain Management (SSCM): Ethical sourcing, low-carbon logistics, and collaboration with green suppliers. Hayleys uses blockchain to trace sustainable palm oil sourcing and hybrid vehicles for logistics.

Stakeholder Collaboration: Partnering with governments, NGOs, and communities to scale sustainability efforts. Silvestre and Țircă (2019) stress cross-sector partnerships in emerging markets. Hayleys collaborates with the UN Global Compact and World Bank on reforestation and solar projects.

Cultivating a workforce dedicated to sustainability through training, incentives, and accountability. Paillé et al. (2014) link employee engagement to a 20% increase in waste segregation rates. Hayleys Example implementation of "Green Teams" and gamified KPIs has led to an 18% reduction in per-unit waste since 2020.



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**Technological Innovation** - Utilizing digital tools (IoT, AI) to track and enhance resource usage. Khan et al. (2021) highlight the importance of smart sensors for improving energy efficiency. Hayleys Example IoT sensors in packaging facilities have decreased idle-time energy consumption by 12%.

**Regulatory Compliance and Adaptation** - Complying with environmental regulations while voluntarily surpassing minimum standards. Linnenluecke et al. (2013) emphasize that compliance serves as a foundation for sustainability leadership and successfully obtained ISO 14001 (environmental management) and ISO 50001 (energy management) certifications.

**Economic Viability** - Ensuring that green initiatives lead to cost savings or new revenue opportunities. De Giovanni (2020) discovered that circular economy models can lower costs by 20–30%. Hayleys eco-friendly product lines, such as coir exports, contributed to a 22% increase in revenue from 2020 to 2023.

### VI. THEORETICAL APPROACH

#### Stakeholder Theory

Freeman's (1984) stakeholder theory suggests that organizations need to consider the interests of all stakeholders (such as customers, employees, investors, and communities) to achieve lasting success. The pressure from stakeholders encourages companies to implement green practices. For instance, consumers are increasingly seeking eco-friendly products, while investors are focusing on ESG (Environmental, Social, Governance) compliance. Hayleys' sustainability efforts, including its "Earth Lung" reforestation initiative, meet stakeholder expectations.

Some critics contend that stakeholder theory might prioritize short-term demands at the expense of broader environmental solutions (Banerjee, 2008). Nevertheless, Hayleys' long-term "Hayleys Life" framework effectively balances the immediate needs of stakeholders with the limits of our planet

#### Institutional Theory

Institutional theory (DiMaggio & Powell, 1983) describes how organizations align with external norms, regulations, and societal expectations to achieve legitimacy. Regulatory pressures, such as carbon taxes and waste disposal laws, along with mimetic isomorphism where firms imitate industry leaders drive companies to adopt environmentally friendly practices.

#### Resource-Based View (RBV) and Natural Resource-Based View (NRBV)

RBV (Barney, 1991) posits that competitive advantage arises from unique and valuable resources. NRBV (Hart, 1995) builds on this by focusing on environmental capabilities,

highlighting the importance of pollution prevention, product stewardship, and sustainable development.

Green initiatives, such as waste valorization and the use of renewable energy, become strategic assets that set firms apart. The company's innovative "Hayleys Life" framework and waste-to-wealth initiatives, like coir exports from coconut waste, illustrate the NRBV in action. These efforts generate economic value while minimizing environmental impact.

#### Sustainable Supply Chain Management (SSCM) Theory

SSCM (Carter & Rogers, 2008) incorporates environmental and social considerations into the design of supply chains, focusing on ethical sourcing, green logistics, and collaboration with suppliers. More than 70% of emissions from organizations originate in their supply chains (CDP, 2023), highlighting the importance of SSCM in reducing carbon footprints.

#### Social-Ecological Systems (SES) Theory

SES theory (Ostrom, 2009) conceptualizes organizations as part of interconnected social and ecological systems, highlighting the importance of resilience and adaptive governance. Companies need to adjust their operations to align with ecological constraints (such as water scarcity and biodiversity loss). The company's initiatives for water stewardship in drought-affected Sri Lanka (including rainwater harvesting and drip irrigation) embody the SES principles of resource resilience.

### VII. PROBLEM STATEMENT

The urge to take care of the environment has forced manufacturing sectors in Sri Lanka to adopt sustainable practices for waste reduction and reduction of carbon emissions. Manufacturing industries are expected to be a major contributor to waste generation and greenhouse gas emissions, hence forcing organizations to shift toward greener operations. Moreover, the government of Sri Lanka has come up with policies for sustainable development, and proper implementation of the policy initiatives such as the National Environmental Action Plan 2021–2030. Further, the present trends of increasing sustainable development, most organizations, in practice face various obstacles such as high implementation costs, technological inability, lack of stakeholder awareness, and sector-specific inability. These factors actually create barriers to integrating green practices in day-to-day operations. Moreover, the non-availability of sector-specific data and practical guidelines are restricting the proper implementation the National Environmental Action Plan 2021–2030. Therefore, this study tries to address exactly to what extent these initiatives have been undertaken to reduce waste and carbon footprints in Sri Lanka. Specifically, Hayleys PLC Being one of the largest conglomerates in the country, has initiated a number of sustainability-related



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projects across its 16 business sectors, including renewable energy, eco-friendly packaging, and waste management programs.

This research, focusing on Hayleys PLC, underlines the barriers, enablers, and outcomes of green practices in a multi-sectoral organizational framework. The findings will be able to develop valuable insights on how businesses can overcome challenges and achieve their sustainability goals while contributing toward broader environmental objectives in Sri Lanka.

This research addresses the urgent need to understand the drivers of adopting and implementing green practices that reduce waste and carbon emissions.

### VIII. RESEARCH OBJECTIVES

1. To explore the level of green practices relating to carbon footprint management (CFM) in Hayleys PLC.
2. To analyze the level of carbon footprint management (CFM) in Hayleys PLC.
3. To analyze types of green practices on carbon footprint management (CFM) in Hayleys PLC.

### IX. RESEARCH QUESTIONS

4. What is the level of Hayleys PLC's green practices relating to carbon footprint management (CFM)?
5. What is the level of Hayleys PLC's carbon footprint management (CFM)?
6. What are types of green practices on Hayleys PLC's carbon footprint management (CFM)?

### Research Methodology

#### X. INTRODUCTION

The research methods section explains the entire design framework of this study starting with conceptual elements followed by hypothesis generation and sampling and lastly data collection procedures and analysis points.

#### XI. RESEARCH DESIGN

The research design provides the overarching plan for conducting the study. This section describes the key elements of the research design based on the framework developed by Saunders et al. (2019).

The study draws its hypotheses about green practice effects on waste and carbon footprint from previously published literature material. The researcher uses quantitative data from Hayleys PLC to validate the hypotheses.

#### Research Method

The methodological choice refers to the selection of quantitative, qualitative, or mixed methods. The researchers employed quantitative methods to focus on number-based data

collection and statistical analysis following Creswell and Creswell (2018).

Through its quantitative approach researchers can perform objective variable measurement and identify relationships that exist between these variables.

### Variables

A survey approach enabled the collection of data from 196 participants working in different sectors of Hayleys PLC through a quantitative method. The research studied four separate variables including RED (reduce) and REU (reuse) and REC (recycle) with REP (repair) as well as their effect on CFM (carbon footprint management). The research evaluated Hayleys PLC's green practices through two main objectives regarding waste reduction and carbon footprint decrease. The study focused on two specific goals to understand environmental and operational effects of green practice adoption while exploring implementation methods for sustainability initiatives.

All green practices including RED and REU and REC and REP showed strong positive relationships with carbon footprint management (CFM). The regression statistics showed the green practices contributed to explaining 90.4% of the total variance in carbon footprint management. All four research predictions received approval through data confirmation which showed strong positive relationships between reduce reuse recycle and repair procedures and waste and carbon footprint management at Hayleys PLC.

### XII. CONCEPTUAL FRAMEWORK

The conceptual framework shows how the main research elements visually connect and relate to each other throughout this study. The framework is a research direction because it guides hypothesis development work alongside data-gathering procedures (Miles et al., 2014).

#### Green Practices - Independent Variable

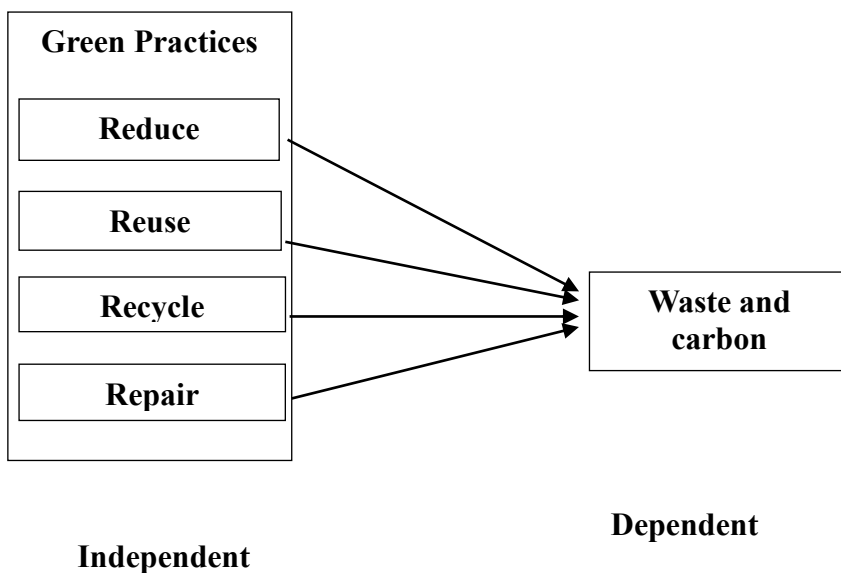
Green practices represent the set of environmentally conscious organizational measures organizations use to decrease environmental impact. The independent variable of this study comprises four operational dimensions such as reduce, reuse, recycle and repair the waste that compose green practices.

#### Waste and Carbon Footprint - Dependent Variable

The study depends on waste and carbon footprint reduction as its main outcome variable. The organizational waste reduction strategy focuses on decreasing the amount of solid waste the organisation produces. Organizations must decrease their

operations-related greenhouse gas emissions when talking about carbon footprint reduction.

### Conceptual Framework



### XIII. HYPOTHESIS DEVELOPMENT

Based on the conceptual framework and existing literature, the following hypotheses were developed:

- H<sub>01</sub>: There is no significant relationship between green-reduction practices on waste and carbon footprint management.
- H<sub>11</sub>: There is a significant relationship between green-reduction practices on waste and carbon footprint management.
- H<sub>02</sub>: There is no significant relationship between reusing green practices on waste and carbon footprint management.
- H<sub>12</sub>: There is a significant relationship between reusing green practices on waste and carbon footprint management.

H<sub>03</sub>: There is no significant relationship between green recycling practices on waste and carbon footprint management.

H<sub>13</sub>: There is a significant relationship between green recycling practices on waste and carbon footprint management.

H<sub>04</sub>: There is no significant relationship between green repair practices on waste and carbon footprint management.

H<sub>14</sub>: There is a significant relationship between green repair practices on waste and carbon footprint management.

### XIV. POPULATION AND SAMPLE

#### Unit of Analysis

Individual employees at Hayleys PLC constitute the analysis unit for this study. A sample of employee responses measured their perspectives about green practice deployment alongside waste reduction and carbon footprint management results.



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### Population

This study's target population comprises all Hayleys PLC employees across its candy business sectors and locations in Sri Lanka. As of 2023, Hayleys PLC employs approximately 400 individuals across its diverse portfolio of businesses.

### Sample

A sample of 196 employees was selected from the target population to participate in the study. This sample size was determined based on statistical power calculations of Morgan Table. Simple random sampling ensured representation from different business sectors and hierarchical levels within Hayleys PLC.

### Data Collection Method

Primary data were collected through a structured questionnaire survey administered to the selected sample employees of Hayleys PLC. The questionnaire was designed to gather information on implementing green practices and waste/carbon footprint reduction outcomes. The research evaluated connections between independent variables and dependent variable through four proposed hypotheses. A

structured questionnaire served as the data collection method while analysis took place with SPSS version 25. The study utilized descriptive analysis together with reliability and validity tests and correlation analysis and multiple regression analysis.

### Validity and Reliability

To ensure the validity and reliability of the research instrument, the following measures were taken,

1. Content validity was established through expert review of the questionnaire by academics and industry professionals.
2. Reliability was evaluated using Cronbach's alpha coefficient for internal consistency.

### Methods of Measurements

The questionnaire utilized a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) to measure employee perceptions of green practices implementation and waste/carbon footprint reduction. Objective waste generation and carbon emissions metrics were also collected from organizational records.

## XV. OPERATIONALIZATION

### Operationalization Table

Variable	Dimension	Indicators	Measurements	Sources
Green Practices	Reduce	Resource conservation efforts	5-point Likert scale	Zaman & Lehmann (2013)
	Reuse	Product life extension initiatives	5-point Likert scale	Castellani et al. (2015)
	Recycle	Waste material recovery programs	5-point Likert scale	Memon (2010)
	Repair	Product reproduce as it is programs	5-point Likert scale	Castellani et al. (2015)
Waste and Carbon Footprint	Waste Reduction	Decrease in solid waste in employees perspectives	Metric tons/year	Ghisellini et al. (2016)
	Carbon Footprint Reduction	Decrease in greenhouse gas emissions in employees perspectives	5-point Likert scale	Geng et al. (2019)

Source : Author Constructed (2025)



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### XVI. STATISTICAL TOOLS

This statistical analysis provided insights into the strength and direction of associations between variables. This analysis provided insights into the strength and direction of associations between variables. Regression analysis use Multiple regression analysis the relationship between independent variables, including green practices, and dependent variables, such as waste/carbon footprint reduction. The established analysis system enabled scientists to determine which green practices produce the most significant ecological effects.

### XVII. ETHICAL CONSIDERATIONS

The research maintained ethical standards in all its performance stages.

All participants granted their informed consent, and respondents were protected from disclosure of their response information. The institutional review supervisor approved the research design, and the analysis involved data coded for participant privacy protection.

#### Data Presentation & Analysis

##### Gender Distribution

The sample population demographics at Hayleys PLC provide essential information that helps explain how green practices are applied within the organization. This data showed that males predominated among the participants, with 120 respondents (61.2%) compared to 76 female respondents (38.8%). Many stakeholders working for Hayleys PLC are men because male workers represent the dominant workforce in Sri Lanka's corporate industry, specifically in manufacturing and agricultural regions, aligning with Hayleys PLC's core sectors (Hayleys PLC, 2022).

##### Age Distribution

Age distribution reveals critical age-related information about the workforce at Hayleys PLC who practice green initiatives. The workforce of Hayleys PLC showed its highest distribution within the age bracket of 41-50 years, which accounted for 31.1% of participants, whereas the 31-40 years group included 24.5% of employees. The dominant proportion of middle-aged workers indicates that Hayleys PLC employs personnel with considerable work experience, which enhances their ability to handle advanced sustainable programs. Young staff members (10.7% between 18-20 years and 23.5% between 21-30 years) bring a valuable mix of beginner and seasoned prowess to develop innovative green strategies. Because of physical job demands and retirement standards at Hayley's multiple operations, the workforce has only a minimal percentage of employees over 51 (10.2%).

##### Education Level

The educational backgrounds of survey respondents, since their knowledge level, directly affects green practice

implementation. Thirty-two per cent (32.1%) of survey participants owned A/L qualifications as their highest level of education, while vocational training made up another 24.5%. The educational background shows a workforce with experienced practical abilities that will benefit the implementation of green practices, particularly in the industrial manufacturing and agricultural fields. Employees holding diplomas and bachelor's degrees amount to 17.9% and 8.2%, respectively, indicating they might take leadership positions on sustainability initiatives. The multivariate educational composition of Hayleys PLC employees enables diverse ideas which help develop solutions that minimize waste and carbon emissions in different operational environments.

##### Work Experience

The employees survey results showed that 36.2% of employees worked at Hayleys PLC between 5 to 10 years, while 28.1% had spent over a decade at the organization. The experienced workforce demonstrates a deep understanding of Hayley PLC procedures, which might enhance their ability to incorporate green practices into their existing operational systems. A beneficial mix of experienced professionals exists within Hayleys PLC since 13.8% of its workforce has under two years of background, while 21.9% has two to five years of experience. Long-time Hayleys PLC employees who work alongside newer hires form an environment where they can exchange knowledge while innovating green practices, thus helping the company lower its waste and carbon output in various sectors.

### XVIII. DESCRIPTIVE ANALYSIS

Descriptive analysis generates database profiling that reveals variable central tendencies and distribution patterns as well as variable variability levels. The data analysis through descriptive statistics reveals the main distribution patterns which respondents hold regarding Hayleys PLC's waste reduction and carbon footprint management initiatives.

The majority of participants favored recycling practices (REC) which achieved a mean score of 3.6102 (SD = 1.15377) during the study. The second highest mean value belonged to repair practices (REP) which stood at 3.5959 (SD = 1.11823). The mean scores for both reduce practices (RED) and reuse practices (REU) at 3.5153 and 3.5582 had slightly lower but positive indications from respondents. Hayleys PLC rated well in managing its carbon footprint according to respondents who gave an average score of 3.5745 with a standard deviation of 1.15929.

A moderate range of variability existed within the responses as the standard deviations (1.11823 to 1.15929) were found across all variables. The respondents hold differing opinions about Hayleys PLC's green practices implementation and

effectiveness levels based on the substantial distribution of answers. The median values show a positive skew across all variables by sitting at 3.8 or 4.0. A wide range of perspectives was incorporated into the analysis because survey participants used their entire available response scale between 1.00 to 5.00 for every measure.

**XIX. RELIABILITY**

Internal consistency between items can be evaluated with Cronbach's alpha as one of the most common measures for this purpose (Tavakol & Dennick, 2011). The measurement consistency of a research instrument becomes stronger as Cronbach's alpha values increase between 0 and 1. As per George & Mallery (2003), research acceptability uses Cronbach's alpha values of 0.7 or higher but rates score above 0.8 as good and values exceeding 0.9 as excellent.

The strong reliability measures prove that each scale assesses the same fundamental concept making up each construct. The excellent reliability scores (RED-0.934, REU-0.943, REC-

**Table : Validity**

Variable	KMO Value	Bartlett's Test		Decision
		Appx.Chi-sqr.	Sig.	
RED	0.906	789.961	0.000	Accept
REU	0.895	885.226	0.000	Accept
REC	0.909	827.229	0.000	Accept
REP	0.878	866.894	0.000	Accept
CFM	0.912	894.473	0.000	Accept

Source: Survey data, (2025)

The results validate the construct validity of the measurement scales because they demonstrate that the items per construct demonstrate proper connection and suitability for factor analysis. The measurement instrument demonstrates valid construct properties because the KMO values are high and there are significant Bartlett's test outcomes.

**Normality**

Normality refers to the Skewness and kurtosis are two measures used to assess normality. Skewness indicates the symmetry of the distribution, while kurtosis reflects the peakedness of the distribution (Tabachnick & Fidell, 2013).

For normality, skewness and kurtosis values should ideally be close to zero. Values between -2 and +2 are generally considered acceptable (George & Mallery, 2010). The results indicate, all variables show negative skewness, ranging from -0.632 to -0.706, suggesting a slight tendency towards higher scores. Kurtosis values range from -0.757 to -0.435, indicating slightly flatter distributions than a normal curve. However, all

0.938 and REP- 0.941) provide foundation for believing in the measurement tool and strengthen the validity of findings developed from these scales.

**XX. VALIDITY**

A research instrument demonstrates validity when it properly assesses what it is meant to evaluate (Heale & Twycross, 2015). Two tests were employed to evaluate construct validity during this research through Kaiser-Meyer-Olkin (KMO) sampling adequacy measurement plus Bartlett's Test of Sphericity. The KMO index calculates values within a scale from 0 to 1 that demonstrates strong sampling adequacy when it approaches one. According to Kaiser (1974) factor analysis results can be accepted when the KMO value surpasses 0.6. The analysis checks if the correlation matrix shows substantial differences from a perfect identity matrix through Bartlett's Test of Sphericity. Factor analysis proves appropriate for this study based on a significant result ( $p < 0.05$ ) (Bartlett, 1954).

values fall within the acceptable range of -2 to +2, suggesting that the data do not severely violate the normality assumption. This supports the use of parametric tests in subsequent analyses.

**Multicollinearity**

Multicollinearity occurs when independent variables in a regression model are highly correlated with each other, potentially leading to unreliable and unstable estimates of regression coefficients (Field, 2013). It is assessed using Tolerance and Variance Inflation Factor (VIF) statistics.

**Tolerance and VIF**

Tolerance values below 0.1 and VIF values above 10 indicate problematic multicollinearity (Hair et al., 2010). The results show, Tolerance values range from 0.093 to 0.199, close to but not below the critical threshold of 0.1. VIF values range from 5.018 to 9.453, approaching but not exceeding the critical threshold of 10. While these values suggest some degree of correlation between predictors, they do not indicate severe

multicollinearity that would preclude regression analysis. However, the relatively high VIF values, particularly for REU, REC, and REP, suggest that these variables may share substantial variance, which should be considered when interpreting regression results.

**XXI. CORRELATION**

Correlation analysis examines the strength and direction of relationships between variables (Field, 2013). In this study, Pearson's correlation coefficient was used to assess the relationships between green practices (RED, REU, REC, REP) and carbon footprint management (CFM) at Hayleys PLC. Pearson's correlation, coefficient (r) ranges from -1 to +1, with values closer to  $\pm 1$  indicating stronger relationships. Generally, correlations are considered weak if  $r < 0.3$ , moderate if  $0.3 \leq r < 0.5$ , and strong if  $r \geq 0.5$  (Cohen, 1988). The correlation analysis reveals, all correlations are positive and statistically significant ( $p < 0.01$ ), indicating strong relationships between all variables. The independent variables

**Table : Model Summary**

<b>Model Summary</b>				
Model	R	R Square	Adjusted R Square	Std.Error of the Est.
1	.951 <sup>a</sup>	.904	.902	.36349

a. Predictors: (Constant), REP, RED, REU, REC

Source: Survey data, (2025)

The model summary reveals a strong fit for the regression model. With R = 0.951, there is a robust correlation between, predictors and the dependent variable. The R Square of 0.904 indicates that the green practices explain

(RED, REU, REC, REP) show strong positive correlations with the dependent variable (CFM), ranging from  $r = 0.893$  to  $r = 0.923$ . This suggests that higher levels of green practices are associated with better carbon footprint management at Hayleys PLC. Among the independent variables, the strongest correlation is between REC and REP ( $r = 0.934$ ), suggesting a close relationship between recycling and repair practices. The strong correlations between independent variables (ranging from  $r = 0.872$  to  $r = 0.934$ ) support the earlier observation of potential multicollinearity, which should be considered in regression analysis.

**XXII. REGRESSION**

Multiple regression analysis is a statistical technique used to examine the relationship between multiple independent variables and a dependent variable (Field, 2013). In this study, multiple regression was employed to assess the impact of green practices (RED, REU, REC, REP) on carbon footprint management (CFM) at Hayleys PLC.

90.4% of the variance in carbon footprint management. The Adjusted R Square of 0.902 offers a more conservative estimate.

**Table : ANOVA**

<b>ANOVA<sup>a</sup></b>						
Model		Sum of Square	df	Mean Square	F	Sig.
1	Regression	236.837	4	59.209	448.141	.000 <sup>b</sup>
	Residual	25.235	191	.132		
	Total	262.072	195			

a. Dependent Variable: CFM  
b. Predictors: (Constant), REP, RED, REU, REC

Source: Survey data, (2025)

The ANOVA results demonstrate the statistical significance of the regression model. With a large F-statistic of 448.141 and a p-value less than 0.001, the model explains a substantial portion of the variance in carbon footprint

management (CFM). This indicates that at least one of the green practices (RED, REU, REC, REP) has a significant relationship with CFM at Hayleys PLC.



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The coefficients table reveals the individual contributions of each green practice to carbon footprint management (CFM) at Hayleys PLC.

All practices (RED, REU, REC, REP) demonstrated positive and statistically significant relationships with CFM ( $p < 0.05$ ). Reuse practices (REU) exhibited the strongest impact ( $B = 0.298$ ,  $\beta = 0.294$ ), followed by repair (REP), reduce (RED), and recycle (REC) practices. The non-

### Table : Hypothesis Testing

Hypotheses	Slope	P value	Decision
H1: There is a significant relationship between green reduce practices on waste and carbon footprint management.	0.239	0.000	Supported
H2: There is a significant relationship between reuse green practices on waste and carbon footprint management.	0.298	0.000	Supported
H3: There is a significant relationship between green recycling practices on waste and carbon footprint management.	0.188	0.000	Supported
H4: There is a significant relationship between green repair practices on waste and carbon footprint management.	0.278	0.000	Supported

Source: Survey data, (2025)

The statistical relationships showing  $p < 0.05$  validated the four hypotheses regarding green practice links to carbon footprint management. Green initiatives under the reuse category ( $\beta = 0.298$ ) produced the highest effects on carbon footprint management (H2), followed by repair strategies ( $\beta = 0.278$ ) shown in H4 and then by reduce practices ( $\beta = 0.239$ ) of H1 and recycle approaches ( $\beta = 0.188$ ) in H3. The research results demonstrate that Hayleys PLC runs effective green initiatives for waste reduction and carbon footprint minimization.

### Conclusion & Recommendations

#### XXIV. SUMMARY OF THE STUDY

The research investigated green practice adoption as a method to minimize waste along with carbon emissions in organizational operations at Hayleys PLC which operates in Sri Lanka. Risk factors about global environmental threats lead organizations to embrace sustainable operational practices which decrease their environmental effects while delivering efficient business operations. A research initiative worked to evaluate the effectiveness of implementing green practices at Hayleys PLC to decrease waste generation and carbon emissions from their operations as Sri Lanka's main industrial conglomerate.

#### XXV. DISCUSSION OF THE RESULTS

The present section analyzes the author presents findings based on the research aims and developed hypotheses.

significant constant term ( $p = 0.962$ ) indicates the regression line's proximity to the origin.

#### XXIII. HYPOTHESIS TESTING

The hypothesis testing results, presented in Table below, provide strong evidence for the impact of green practices on waste and carbon footprint management at Hayleys PLC.

Objective 1: To assess the level of Hayleys PLC's green practices relating to carbon footprint management (CFM). The research established that Hayleys PLC utilizes extensive environmental practices throughout its business operations. Evidence shows that Hayleys PLC strongly embraces green practices based on its high mean scores across all dimensions (RED: 3.5153, REU: 3.5582, REC: 3.6102, REP: 3.5959).

Previous Research showed that organizational adoption of green practices leads to major waste reduction and energy conservation results.

Objective 2: To analyze the level of Hayleys PLC's carbon footprint management (CFM)

The descriptive analysis revealed that there is significant level of carbon footprint management. Evidence shows that Hayleys PLC strongly embraces green practices based on its high mean scores of (3.5745). This aligns with previous research that reuse strategies can significantly reduce environmental impacts across product life cycles.

Objective 3: The identification of green practices on Hayleys PLC's carbon footprint management (CFM)

H1: The impact of green reduce practices on waste and carbon footprint management was supported ( $\beta = 0.239$ ,  $p < 0.001$ ), consistent with the effectiveness of waste reduction initiatives.

H2: Reuse green practices showed the strongest impact on waste and carbon footprint management ( $\beta = 0.298$ ,  $p < 0.001$ ), supporting previous research on the importance of reuse in circular economy models.

H3: Green recycling practices demonstrated a significant impact ( $\beta = 0.188$ ,  $p < 0.05$ ), aligning with previous studies on the role of recycling in organizational waste management.

H4: Green repair practices also showed a significant impact ( $\beta = 0.278$ ,  $p < 0.001$ ), supporting findings on the effectiveness of product life extension strategies in reducing environmental impact.

Organizations can make maximal progress in waste reduction and carbon footprint control by focusing on reuse practices since they demonstrate the highest statistical significance ( $\beta = 0.298$ ). According to previous findings show that product life cycles benefit greatly from reuse strategies.

Sustainable business operations benefit the most from repair practices because they deliver a significant positive impact ( $\beta = 0.278$ ). Reduction of practices ( $\beta = 0.239$ ) proved vital since organizations must focus on minimizing resource use and waste production from their supply sources. The waste hierarchy principle supports this result because prevention and reduction represent the most effective waste management approaches (Zaman & Lehmann, 2013). Among the four green practices recycling practices ( $\beta = 0.188$ ) demonstrated the lowest impact but were still significantly important for waste and carbon footprint management. Recycling maintains its importance toward waste management goals because organizations focus on advanced waste hierarchy measures.

#### XXVI. IMPLICATIONS OF THE STUDY

The findings of this study at Hayleys PLC showed the strongest impacts on carbon footprint management in Sri Lanka. The findings underscore the importance of prioritizing reuse and repair practices. From a practical point of view, it shows the strong positive relationships between green practices and carbon footprint management compelling organizations to invest in comprehensive sustainability initiatives. The results suggest that a balanced approach incorporating reduce, reuse, recycle, and repair practices can yield significant environmental benefits. It may involve in developing strategies to extend product lifecycles, implement take-back programs, and enhance repair services. For the academic point of view, it contributes more in improving existing literature on green practices in organizational settings, particularly in the context of developing countries. The regression model provides robust empirical support for the effectiveness of

green practices in reducing environmental impact. The governments should provide incentive and support for the adoption of green practices, particularly in sectors with high environmental impact. The findings could inform the development of sector-specific guidelines and standards for sustainable operations in the organizations.

#### XXVII. LIMITATIONS OF THE STUDY

This study has several limitations although its contributions are significant. The cross-sectional nature of the long-term data collection on green practice implementation provide more meaningful information in the relationships. The focus on more organizations with more in depth, may provide significant meaning for generalizing of findings to other contexts or industries. The reliance on self-reported data from employees of the particular organization may introduce potential bias.

However, various group of people from similar industries including public pressure groups may be included in the future studies to get benefit from incorporating objective measures of waste reduction and carbon emissions. Additionally, the high correlations between independent variables suggest potential multicollinearity, which may affect the interpretation of individual variable impacts.

#### XXVIII. CONCLUSION

This study examined implementation of green practices to reduce waste and carbon footprint at Hayleys PLC in Sri Lanka. The findings of the research shows that strong positive relationships between reduce, reuse, recycle, and repair practices and carbon footprint management. The research findings validated the four initial predictions while reuse practices demonstrated maximum effects. A thorough sustainability strategy which includes various green practice methods proves to be highly effective according to the research findings. The regression model explains that these green practices hold essential positions for environmental impact control within organizations. These research findings carry great implications for similar industries in Sri Lanka along with other developing countries since they focus on environmental sustainability versus economic development equilibrium issues. Research data demonstrates both ecological effectiveness and operational feasibility of green programs when used to improve environmental results even while maintaining service efficiency.

#### XXIX. RECOMMENDATIONS

Considering the study results several recommendations have been developed to serve both Hayleys PLC and similar organizations:



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1. Implement reuse strategies that produce substantial positive effects of product lifecycle extension and take-back program development.
2. Establishing repair and services centers for the company's products and maintain customer relation habits because repair procedures have demonstrated substantial effects.
3. Green operational practices at the all operation in the organizations should be very important because it shows the strong relationships between these practices. Every business unit of an organization needs to follow a complete sustainability approach that combines reduce reuse recycle along with products repair initiatives.
4. Establishing HRM section at top priority and conduct necessary training programs all level of employees as the high reliability scores demonstrate consistent application of green practices.
5. The assessment of environmental performance requires both routine monitoring and transparent documentations about waste reduction metrics and carbon footprint measurements for defect tracking.
6. Partnership with stakeholders involves working with suppliers and customers along with industry members to spread green practices throughout the value system and achieve maximum environmental advantages.

### REFERENCES

- [1] Agyabeng-Mensah, Y., Afum, E., & Ahenkorah, E. (2020). Green supply chain management and operational performance. *Business Strategy and the Environment*, 29(3), 1231-1248.
- [2] Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- [3] Bartlett, M. S. (1954). A note on the multiplying factors for various  $\chi^2$  approximations. *Journal of the Royal Statistical Society. Series B (Methodological)*, 16(2), 296-298.
- [4] Bocken, N. M., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33(5), 308-320.
- [5] Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management. *Journal of Business Logistics*, 29(1), 27-38.

### XXX. RECOMMENDATIONS FOR FUTURE RESEARCH

Several improvements can enhance this research design through future investigations. Research carried out over time could better understand both the development of green practice implementation and its evolving effects across periods. The generalization of findings would increase through research expansion across different industries through multiple organizations. The analysis would benefit from addition of objective waste reduction and carbon emission measurements to support the self-reported data. Qualitative research integration would help provide better understanding regarding implementation barriers together with the factors leading to successful implementations. Specific research on each business sector can measure how effective green practices function in manufacturing industries in addition to agriculture sectors and service-based systems. Research on economic impacts through studies would analyze business financial aspects of green practices while assessing costs reductions and new revenue streams. Research should evaluate policy effectiveness through studies regarding government incentives that drive companies to accept green practices. Research exploring these topics will help build an adequate knowledge base about green practice adoption as an organizational sustainability method across various settings.

- [6] Castellani, V., Sala, S., & Mirabella, N. (2015). Beyond the throwaway society: A life cycle-based assessment of the environmental benefit of reuse. *Integrated Environmental Assessment and Management*, 11(3), 373-382.
- [7] Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.
- [8] Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.
- [9] De Giovanni, P. (2020). Circular economy and sustainable supply chain management: A case study. *Journal of Cleaner Production*, 255, 120353
- [10] DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality. *American Sociological Review*, 48(2), 147-160.



## International Journal of Recent Development in Engineering and Technology

Website: [www.ijrdet.com](http://www.ijrdet.com) (ISSN 2347 -6435 (Online)), Volume 15, Issue 4, April 2026)

- [11] Fargione, J., Bassett, S., & Boucher, T. (2018). Natural climate solutions. *Science Advances*, 4(11), eaat1869.
- [12] Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). Sage Publications.
- [13] Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman Publishing.
- [14] Geng, Y., Sarkis, J., & Bleischwitz, R. (2019). How to globalize the circular economy. *Nature*, 565(7738), 153-155.
- [15] George, D., & Mallery, M. (2010). *SPSS for Windows step by step: A simple guide and reference, 17.0 update* (10th ed.). Pearson.
- [16] George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference, 11.0 update* (4th ed.). Allyn & Bacon.
- [17] Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production*, 114, 11-32.
- [18] Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson Education Limited.
- [19] Hart, S. L., & Dowell, G. (2011). A natural-resource-based view of the firm: Fifteen years after. *Journal of Management*, 37(5), 1464-1479.
- [20] Hayleys PLC. (2022). *Annual Report 2021/22*. Hayleys PLC.
- [21] Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-based Nursing*, 18(3), 66-67.
- [22] Hussain, M., Zhang, Y., & Rafiq, M. (2022). The role of renewable energy investments in reducing carbon emissions. *Energy Policy*, 165, 112935.
- [23] Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31-36.
- [24] Khan, S. A., Yu, Z., & Golpîra, H. (2021). Blockchain and sustainability in supply chains. *Sustainable Development*, 29(5), 1031-1045.
- [25] Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127, 221-232.
- [26] Kumar, A., & Anbanandam, R. (2019). Development of social sustainability index for freight transportation system. *Journal of Cleaner Production*, 210, 77-92.
- [27] Linnenluecke, M. K., Griffiths, A., & Winn, M. I. (2013). Organizational resilience and sustainability. *Business Strategy and the Environment*, 22(3), 177-191.
- [28] Memon, M. A. (2010). Integrated solid waste management based on the 3R approach. *Journal of Material Cycles and Waste Management*, 12(1), 30-40.
- [29] Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Sage Publications.
- [30] Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. *Science*, 325(5939), 419-422.
- [31] Paillé, P., Chen, Y., Boiral, O., & Jin, J. (2014). The impact of environmental practices on employee engagement. *Journal of Business Ethics*, 124(2), 223-235.
- [32] Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson Education Limited.
- [33] Silvestre, B. S., & Țircă, D. M. (2019). Innovations for sustainable development: Moving toward a circular economy. *Journal of Business Research*, 96, 285-296.
- [34] Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson Education.
- [35] Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55.
- [36] Wynes, S., Nicholas, K. A., Zhao, J., & Donner, S. D. (2021). Evaluating the effectiveness of carbon offset programs. *Environmental Research Letters*, 16(6), 064019.
- [37] Zaman, A. U. (2015). A comprehensive review of the development of zero waste management: Lessons learned and guidelines. *Journal of Cleaner Production*, 91, 12-25.
- [38] Zaman, A. U., & Lehmann, S. (2013). The zero waste index: A performance measurement tool for waste management systems in a 'zero waste city'. *Journal of Cleaner Production*, 50, 123-132.