Cleaner and Responsible Consumption 15 (2024) 100226

Contents lists available at ScienceDirect

Cleaner and Responsible Consumption

journal homepage: www.journals.elsevier.com/cleaner-and-responsible-consumption

Harmonizing business practices of events and convention industry through sustainability assessment framework development

Ilanur Elyssa Bart Aswain [a], Norasikin Ahmad Ludin [a,*], Hasila Jarimi [a], Kathleen L. Purvis-Robert [b], Norul Hisham Hamid [c], Mohd Zulkifly Mohd Shariff [d], John Burke [d]

[a] Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia (UKM), 43600, Bangi, Selangor, Malaysia
[b] Claremont McKenna, Pitzer, and Scripps Colleges, W.M. Keck Science Department, 925 N. Mills Avenue, Claremont, CA91711, USA
[c] Faculty of Forestry and Environment, Universiti Putra Malaysia (UPM), 43400, Serdang, Selangor, Malaysia
[d] Kuala Lumpur Convention Centre, Jalan Pinang, Kuala Lumpur City Centre, 50088, Kuala Lumpur, Malaysia

ARTICLE INFO

Keywords:
Corporate sustainability
Sustainability assessment framework
Event and convention
Economic impact assessment
Return of sustainability investments

ABSTRACT

The global event and convention industry is singlehandedly one of the largest and most lucrative sectors in business forecasting market size projected at approximately more than two trillion U.S. dollars by 2028. Despite being a significant contributor to global economic growth, the event and convention industry faces a pressing environmental challenge due to its substantial carbon footprint. Current practices in the industry inadequately address sustainability concerns, leading to a critical gap in integrating environmental considerations into core business models. The lack of sustainability considerations contributes to climate degradation and undermines the industry's long-term success and resilience. This observation signifies the need for a more systematic trajectory toward total decarbonization of the industry through the implementation of sustainable practices across its value chain. This work aims to develop a conceptual framework of sustainability assessment for a case study in the event and convention sector integrating two indicators: greenhouse gas emissions and energy consumption. The result identified a critical gap in current practices regarding the insufficient integration of sustainability assessment into the core financial business models of firms. The authors propose a new approach to address this by integrating economic impact analysis through the employment of the Return of Sustainability Investments – discovered as the most effective sustainability economic impact assessment method in this study. To facilitate optimized implementation, a multilevel strategy framework enabling the adoption of a sustainability assessment is presented in this paper. This paper contributes to improved execution of sustainability assessments, where the framework can be applied in heterogeneous sectors.

1. Introduction

The basic principle of sustainability theory encompasses the balance between economic, environmental, and social pursuits in fostering a more responsible stewardship of firms (Proikaki et al., 2018). Due to this, theorists have established that natural and financial capital, ecological and biological conservation, and societal welfare and empowerment are dynamically interrelated (Anderson, 2010). Historically, sustainability theories focused on single pillars without integrating others. Over time, the approach to sustainability has evolved, with corporate social responsibility, stakeholder theory, corporate sustainability, and green economics becoming more interconnected (Chang et al., 2017; Hull and Rothenberg, 2008). Stakeholders now recognize the importance of integrating environmental conservation and community support into business models (Berry-Stölzle and Xu, 2018).

In our interconnected world, climate change presents a global challenge requiring collective action. Businesses are increasingly seen as agents of change, embedding sustainable practices into their operations (World Commissions on Development and Environment, 1983). The urgency to enhance sustainability practices is reflected in recent mandates for sustainability reporting, such as the European Commission's Corporate Sustainability Reporting Directive and ASEAN countries adopting ISSB Standards (Corporate Sustainability Reporting Directive, 2023; Securities Commission Malaysia, 2024). This scenario indicates the need for a more systematic trajectory towards total decarbonization and enhanced responsible stewardship of companies – an objective that can only be attained through developing a modular sustainability

* Corresponding author.
E-mail address: sheekeen@ukm.edu.my (N. Ahmad Ludin).

https://doi.org/10.1016/j.clrc.2024.100226
Received 19 March 2024; Received in revised form 14 September 2024; Accepted 18 September 2024
Available online 21 September 2024

List of abbreviations

CBA	Cost-Benefit Analysis
fCBA	Conventional Cost-Benefit Analysis
eCBA	Environmental Cost-Benefit Analysis
sCBA	Social Cost-Benefit Analysis
CO_2e	Carbon Dioxide Equivalent
EPA	Environmental Protection Agency
ESG	Environmental, Social and Governance
GDP	Gross Domestic Production
GHG	Greenhouse Gases
IPCC	Intergovernmental Panel on Climate Change
ISSB	International Sustainability Standards Board
ISO	The International Organization for Standardization
KPI	Key Performance Indicators
kWh	Kilowatt-hour
LCC	Lifecycle Cost
fLCA	Conventional Lifecycle Cost
eLCC	Environmental Lifecycle Cost
sLCC	Social Lifecycle Cost
MRV	Measurement, Reporting and Verification
NDC	Nationally Determined Contributions
NPV	Net Present Value
OTTV	Overall Thermal Transfer Value
PLC	Public-Listed Company
ROSI™	Return of Sustainability Investments
SA	Sustainability Assessment
SME	Small and Medium Enterprises
UNSDG	United Nations Sustainable Development Goals

assessment (SA) framework (McBrayer, 2018).

Embedding sustainability into business strategy is imperative for long-term success. Integrating ESG (Environmental, Social, and Governance) practices aligns corporate objectives with planetary and community well-being. Studies show that incorporating ESG factors into core business models drives sustainable growth and improves financial performance (Alshehhi et al., 2018; Castillo-Merino and Rodríguez-Pérez, 2021; Matuszewska-Pierzynka, 2021; Nicolăescu et al., 2015). Despite this, there is a gap in comprehensive sustainability analyses that integrate global, industry-specific, and local perspectives.

The global event and convention industry is a significant contributor to the global economy, with a market size projected to exceed two trillion U.S. dollars by 2028. In 2023, this industry contributed USD 1.6 trillion to global GDP and supported 10.9 million job opportunities, ultimately generating an income of USD 2.8 trillion (Events Industry Council, 2023). With 1.6 billion participants across 180 countries traveling for business events, the industry plays a pivotal role in facilitating international business and cultural exchange (Events Industry Council, 2023). However, it also has a substantial environmental impact, with a single 1000-delegate three-day event generating 530 metric tons of CO2e (Meet Green, 2014). As the number of international events is projected to double every ten years (International Congress and Convention Association, 2018), the industry must commit to continuous sustainability improvements to mitigate climate change.

Despite the significant economic impact and environmental footprint of the event and convention industry, there is a lack of a comprehensive framework for SA that integrates both environmental and economic dimensions. Current practices inadequately address these concerns, creating a critical gap that hinders effective sustainability integration and measurement. Addressing this gap is crucial for several reasons. First, it enables industry to mitigate its substantial carbon footprint, contributing to global efforts against climate change. Second, integrating sustainability into core business models enhances the industry's resilience and long-term viability. Finally, a robust sustainability assessment framework can drive policy changes and set new standards for the industry, promoting widespread adoption of sustainable practices. This framework also facilitates stakeholder engagement by providing transparency and accountability, and its adaptability ensures relevance across different event scales and types.

To address this, the work done in this study is aimed at developing a modular theoretical framework for SAs using two indicators which are greenhouse gases (GHG) emissions and energy consumption for the case study firm in the events and convention sector. The framework developed is flexible to be adjusted and applied to other industries. The authors identified a gap in current practices rooted in the lack of attention given to the integration of sustainability into the core financial business model. In addressing this, the approach taken is to introduce an additional element of calculating the profitability of implementing GHG emissions management and energy efficiency strategies. In this study, the authors identified the Return of Sustainability Investments (ROSI) method as the most robust and effective economic impact analysis technique for calculating profit coming from implementing sustainability practices. Additionally, the authors observed the need for a multilevel strategy framework in enabling the adoption of the SA framework.

The work done in this study contributes to the knowledge field of corporate sustainability while supplementing the implementation of the framework into real-world applications for corporate sustainability practitioners, policymakers, and future academic studies. The paper is organized as follows. Section 2 presents the Method used to develop the theoretical framework for SA for the case study, Kuala Lumpur Convention Centre (KLCC). Section 3 is the Literature Review conducted to develop two frameworks, theoretical SA framework and multi-level strategy framework for SA adoption. Section 4 presents the Results where the two frameworks are discussed. Section 5 provides policy implications of the two frameworks. Lastly, Section 6 is the Conclusion where the authors conclude the paper.

2. Method

This study utilizes a literature review for the development of the SA framework, coupled with the environmental data available at the case study. This section elaborates on the review approach and case study background for the framework development. The framework development integrates the application of the ROSI approach.

2.1. Literature review approach

A narrative review approach was adopted to provide a comprehensive overview of existing knowledge, identify gaps, and synthesize findings across various studies. This flexible methodology is suitable for summarizing and interpreting the body of literature in the field of sustainability assessment.

2.1.1. Literature search strategy

The search spanned multiple databases, including Google Scholar, Web of Science, and Scopus. Search terms included variations and combinations of "sustainability assessment," "sustainability indicators," "sustainability impact assessment," "economic impact assessment," and "event and convention sector."

2.1.2. Inclusion and exclusion criteria

The inclusion criteria encompassed peer-reviewed scientific articles and grey literature such as industry practice reports, globally recognized

environmental and sustainability standards, and policy papers. Resources were considered if published in English within the past two decades to ensure the evolution of SA methodologies was properly encapsulated. Exclusion criteria included non-peer-reviewed sources, materials not relevant to sustainability assessment, and resources published in languages other than English. The inclusion of grey literature ensured the efficacy and relevance to present industrial practices.

2.2. Return of Sustainability Investments (ROSI)

The tool used to integrate economic evaluations for SA in this paper is the ROSI method (Tracy et al., 2019a). There are five (5) integral steps in conducting ROSI, simplified in Fig. 1. The steps begin with identifying significant material matters to an organization and its corresponding strategies to address those matters. The strategies are then mapped to the pre-determined mediating factors introduced by the developer of the methodology. Then, the economic benefits that will yield business performance improvements are evaluated, subsequently it is quantified. Lastly, the estimated benefits from business performance improvements are calculated in monetary terms using the metric Net Present Value (NPV). Further discussion on the ROSI method is presented in Section 3 of this paper.

The overall costs and benefits as the NPV of estimated future values is calculated using Eq. (1) with a 25-year horizon using a discount rate of 5%. These two (2) values are based on aggregated values presented in Table 3.

$$NPV = \sum_{i=year\ 1}^{10} = \frac{Future\ Value\ of\ Year\ i}{(1 + discount\ rate)^{i}} \quad \text{(Eq. 1)}$$

2.3. Background of case study

To develop and validate the sustainability assessment framework, KLCC was selected as a case study. KLCC is in Kuala Lumpur and spans over 33,000 square meters. The location is the largest convention Centre in Malaysia and includes a variety of event spaces, such as exhibition halls, conference rooms, and banquet facilities. As one of the leading convention centers in Southeast Asia, KLCC is known for hosting a wide range of events, including international conferences, exhibitions, and corporate meetings. However, the scale of events hosted at KLCC has resulted in very high energy consumption and emissions, making it imperative to conduct a comprehensive SA.

2.3.1. Data sources and collection

The data collected from (Table 1) KLCC was used to develop and validate the SA framework. The framework's efficacy is demonstrated through its application to KLCC's operations, highlighting areas of improvement through quantifying the benefits of implemented sustainability practices.

Table 1
Baseline data KLCC.

Type	Data Collected
Year	2022
Number of Events	1388 events
Number of Attendees	664,622 persons
Energy Consumption	11,918,286 kWh
Chilled Water Consumption	5696244.42 RTH

Table 2
Characteristics of sustainability impact assessment methods.

Characteristics	Methods						
	fCBA	eCBA	sCBA	fLCC	eLCC	sLCC	ROSI
Focus on private investments/cash flows	✓			✓			✓
Assesses societal impacts into monetary unit			✓			✓	✓
Focus on real cash flows that are internalized	✓	✓	✓				✓
Costs and variables kept constant over time	✓	✓	✓				✓
Quasi-dynamic approach	✓			✓			✓
Multidimensional (integrated triple-bottom-line evaluation)							✓
Conversion from environmental emissions to monetary measures		✓			✓		✓
Can be performed independently	✓	✓	✓				✓
Information from another methodology is needed	✓	✓	✓	✓	✓	✓	
Monetizes non-internalized environmental costs		✓			✓		✓
Assessing the attractiveness of projects	✓	✓	✓				✓
Assessing products				✓	✓	✓	✓
Standardized							✓

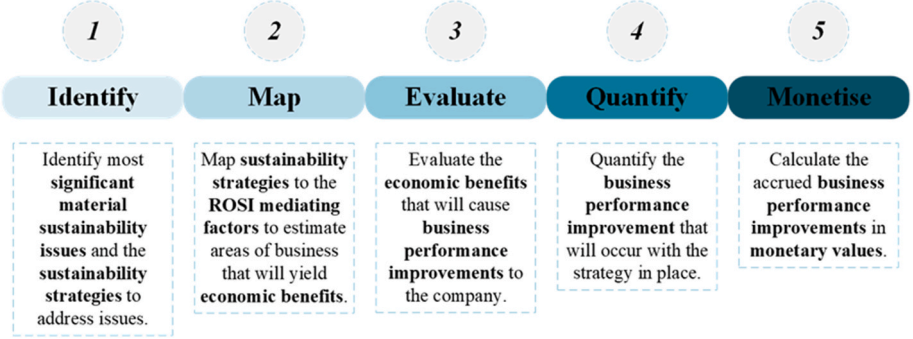

Fig. 1. Schematic diagram of the ROSI methodology.

Table 3
Review of economic impact assessment methods used by previous literature.

Author, Year	Industry	Country	Sustainability Strategy	Method	Accumulated Years	Discount Rate	NPV
Sharvini et al. (2022)	Energy	United States	Energy generation using palm oil mill effluent	CBA	20 years	6%	USD 0.22M–0.54M
Wang et al. (2022)	Building	China	Active and passive building retrofit of 16 hotel buildings	CBA	50 years	6%	CNY 0.49M–2.96M
Gustavsson and Piccardo (2022)	Building	Sweden	Building envelope retrofit of multi-apartment building	LCC	50 years	3%	EUR 36.2K–303.1K
Ghafourian et al. (2022)	Tourism	Greece	Installation of a decentralized circular water system	LCC	20 years	8%	EUR 56.32M
Mikulić et al. (2016)	Building	Hong Kong	Energy retrofit in buildings built between the 1970s–1980s in Croatia	CBA	20 years	5.5%	HRK 0.9M–11.1M
Ruparathna et al. (2017)	Building	United States	Implementation of two scenarios of building energy retrofit in British Columbia	LCC	25 years	5%	USD 63,320–127,908
Pombo et al. (2016)	Building	Spain	Implementation of six scenarios of building energy retrofit in Spanish residential building	LCC	50 years	3%	EUR 184.04–275.93
Tushar et al. (2022)	Building	Australia	Implementation of 5–8 star-rated energy appliances in buildings	CBA	60 years	4%–7%	AUD 14.28M–220.27M
Hirvonen et al. (2022)	Building	Finland	Large-scale energy retrofit of residential buildings	CBA	30 years	3%	EUR 3.7B–3.8B
Xiao et al. (2022)	Waste	China	Sustainable management strategies for sewage sludge disposal	LCC	20 years	4.65%	CNY 1.84M
Fregonara et al. (2017)	Building	Italy	Sustainability integration into end-of-life buildings	LCC	30 years	1.39%	EUR 1.2M–1.9M
Martín-Pascual et al. (2020)	Waste	Spain	Improve the efficiency of waste disposal using valorization of municipal solid waste (MSW)	CBA	10 years	12%	EUR 6.38/ton
Akter et al. (2021)	Energy	Bangladesh	Integration of carbon trading in biogas plants	CBA	15 years	12%	BDT 6.2K
Shao et al. (2019)	Agriculture	China	Use of sustainable fertilizer in agriculture	CBA	20 years	10%	CNY 3.72/m^2
Gholami et al. (2020)	Building	Norway	Installation of building-integrated photovoltaic façade in buildings	LCC	30 years	3%	NOK 0.48M
Hekrle et al. (2023)	Urban Planning	Portugal	Installation of green roofs in city areas	CBA	40 years	10%	EUR 178.44/m^2 – 253.46/m^2
Han et al. (2018)	Automobile (EV)	United States	Incorporation of circular economy in the production of electrical vehicle batteries used in charging stations	CBA	5–20 years	6%	USD 1565.11K–1569.51K
Periyannan et al. (2023)	Hospitality	Sri Lanka	Green retrofitting in hotel buildings in Sri Lanka	CBA	25 years	4.26%	LKR 1.1M–85.97M

3. Literature review

The development of the theoretical framework adopts global best practices and methodologies to ensure a robust and high-efficacy appraisal process. This framework should be used as a guideline to design a more detailed, company-specific SA framework. The following sub-sections elaborate on the development of the framework based on previous studies and industry best practices.

3.1. Development of sustainability assessment framework for KLCC

Identification involves meticulously laying the groundwork for the entire evaluation process by defining the assessment's scope, boundaries, and goals. Defining the scope is the first crucial step in conducting an SA. The organization begins by selecting the ESG pillars to be evaluated, ensuring the scope is manageable and aligned with current needs and planetary conditions (Farias et al., 2020; Pope et al., 2017; Sala et al., 2015). This step sets a clear focus for the assessment and ensures it addresses relevant sustainability aspects, building on the foundational principles outlined by these scholars.

Establishing the boundaries of the assessment involves setting temporal and spatial parameters, a process supported by Moreira et al. (2015). Spatial boundaries may encompass the entire organization, specific projects, or products, while temporal boundaries can range from a single year to the entire lifecycle of a product (Alghamdi et al., 2019; International Organization for Standardization, 2018a). Streamlining these boundaries helps provide an accurate representation of the company's sustainability performance and minimizes overestimation risks. Companies should also identify the limitations of the assessment and develop plans to address them, as recommended by Vanham et al. (2019). In this study, the scope and boundaries focus on evaluating the environmental and economic pillars to initiate sustainability reporting. Stakeholder identification and proactive communication are essential, with stakeholders engaging in two-way communication and feedback mechanisms as outlined by Sala et al. (2015) and presented in Fig. 2.

This paper identifies three perspectives in goal creation; (1) best practices within industries; (2) national goals; and (3) alignment with the Paris Agreement. Best practices are organizational practices that provide sufficient information on sustainability goals and outcomes, based on neutrality, flexibility, and supporting evidence (Nawaz and Koç, 2019). This aligns with the necessity of unbiased, adaptable practices that can evolve with industry standards, as Pranugrahaning et al. (2020) and León-Quismondo et al. (2020) have emphasized. National goals involve aligning with policies and regulations within the operating country to position the company as a publicly responsible corporation and avoid non-compliance repercussions (Kludaczalessandri and Cygańska, 2021; Kosorić et al., 2021). Alignment with the Paris Agreement focuses on reducing carbon intensity by setting Science-Based Targets aligned with the country's Nationally Determined Contributions (NDC), as supported by Perino et al. (2022), and the Malaysia Government (2022).

A materiality assessment is crucial for identifying and prioritizing significant sustainability issues within an organization, ensuring a focused and structured approach to addressing the most impactful areas (Farooq et al., 2021; Garst et al., 2022). This process is supported by methods such as surveys, interviews, and focus group discussions, which contribute to a comprehensive understanding of material issues (Bellantuono et al., 2016; Menichini and Salierno, 2023; Ranängen et al., 2018). The assessment also helps in selecting relevant sustainability indicators, which are essential for the sustainability assessment (SA) framework. Effective sustainability indicators should be simple, measurable, feasible, flexible, dynamic, and user-centric (Ewa Latawiec

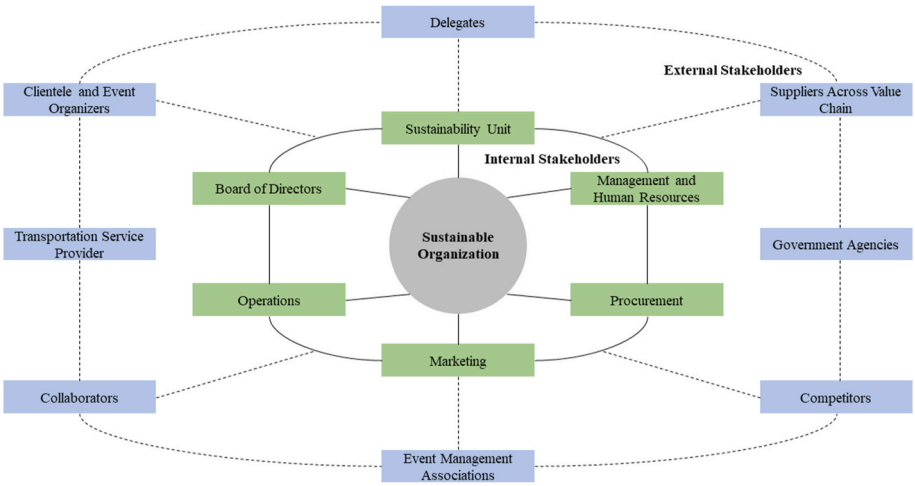

Fig. 2. Schematic diagram of stakeholders (adapted from Arroyo, 2017).

and Garrett, 2015). Simple indicators are easy to communicate and can be aggregated with others within the same category (Donnelly et al., 2007; Santos Coelho et al., 2019). Measurable indicators reduce uncertainty and enhance the reliability of disclosures (Lee and Kim, 2020; Lütje and Wohlgemuth, 2020). Feasible indicators align with accessible data and are cost-effective, while flexible indicators can be adapted for future use and applied across the company's value chain (Dal Mas et al., 2019; Ponomarenko et al., 2021). Dynamic indicators are regularly assessed to effectively track performance (Büyüközkan and Karabulut, 2018; Mata-Lima et al., 2016; Muñoz et al., 2020), and user-centric indicators are designed to inform stakeholders about sustainability performance (Clark and Miles, 2021). After selecting sustainability indicators, it is essential to establish a baseline for measuring ESG impact, such as energy consumption and GHG emissions. The selection of a base year, typically 2019 or later, is crucial for ensuring the relevance and accuracy of baseline data (International Organization for Standardization, 2018b). The principle of conservatism should guide the choice of a base year to avoid overestimating outcomes (Franzoni et al., 2020).

Identifying emissions sources is the inaugural step in developing a GHG inventory model within this framework. Emissions are categorized into three types: Scope 1, Scope 2, and Scope 3. Scope 1 relates to direct emissions from on-site combustions, such as in-house generators and company-owned vehicles, while Scope 2 includes indirect emissions from purchased electricity, heating, cooling, and steaming. Scope 3 encompasses indirect emissions from the company's value chain, with fifteen categories, and although companies must report at least Scope 1 and Scope 2 emissions, reporting Scope 3 is pivotal as it constitutes over 70% of a corporation's emissions (Li et al., 2019). The selection of Scope 3 emission sources should consider factors such as size, influence, risk, stakeholder materiality, outsourcing, sector guidance, and spending or revenue analysis, as outlined by Barrow et al. (2013). Data collection for carbon emissions involves various methodologies prescribed in globally recognized standards like ISO 14604 and the GHG Protocol, which act as guiding documents; however, the actual methodology must be tailored to the company's specific needs and limitations. Often, limitations arise from data availability, necessitating data collection before crafting the methodology (Arioli et al., 2020). Two types of data are essential for performing a GHG inventory: activity data and emission factors. Activity data refers to the quantitative measure of the level of activity within a company based on its emissions source, which can be collected using a bottom-up approach, focusing on the quantity of fuel or materials used (B. Cai et al., 2019), or a top-down approach, examining the cost allocated for actions related to fuel or materials (Lu and Li, 2019). Emission factors, which convert activity data into actual GHG emissions, can be obtained from research papers performing lifecycle assessments or existing databases like the IPCC Emission Factor Database, EPA Emissions Factors Database, and the European Environment Agency Emission Inventory Guidebook (Ding et al., 2021; Ye et al., 2016).

Quantifying energy consumption also involves several approaches to establish its baseline. The International Performance Measurement and Verification Protocol, recognized by the EPA, outlines four methods; (1) retrofit isolation; (2) retrofit isolation with calibration; (3) whole facility; (4) and calibrated simulation (Efficiency Valuation Organization, 2022). This study adopts the whole facility approach, using the energy consumption of the entire facility to establish the baseline. Zhou et al. (2016) utilized regression analysis and modeling to account for changes in environmental conditions in their baseline consumption calculations. Similarly, S. Cai and Gou (2024) employed the whole facility approach, considering various compounding variables affecting energy consumption. For this framework, independent variables such as operating days, operating hours, cooling degree days, and meter voltage readings are included in the regression analysis, as employed by Mohamad Munir et al. (2023).

Selecting a quantification approach for GHG inventory depends on available data, with companies typically choosing between standard, mass-balance, or measurement approaches. The most accurate method, measurement, requires investment in specific machines to capture actual emissions; however, due to its high cost, the standard or estimation approach is more commonly chosen, comparing masses of inputs to emissions factors (Arioli et al., 2020). For this study, the standard approach is selected as the company can provide accurate input data, such as fuel used, refrigerant mass, electricity, and chilled water consumption. Calculating baseline performance and reporting are intricate and complex tasks, necessitating the formation of a proper GHG inventory team that includes technical experts. Once the baseline methodology is finalized, the initial baseline analysis is conducted according to the methodological framework, and it is highly preferable to obtain a second opinion on the developed methodology. Throughout the process, thorough documentation is recommended, especially for organizations aiming for ISO certification, to facilitate third-party verification and validation.

The final step in completing a cycle of SA for this study is to evaluate the economic impacts of implementing sustainability strategies. Conducting an economic impact assessment allows for a thorough analysis of the profitability of deploying energy efficiency measures, thereby enhancing decision-making processes. Typically, economic impact analyses are performed ex-ante for energy retrofit projects. However, this study proposes integrating economic impact analysis as an ongoing component of the overall SA framework, conducted periodically. This

study addresses gaps identified in previous literature and aims to produce higher-impact sustainability outcomes at the corporate level. By prioritizing economic evaluation within corporate sustainability, the integration of sustainability into business models is reinforced. Past literature and meta-analyses provide sufficient evidence that sustainability performance has a direct and significant relationship with corporate financial performance (Prasetya et al., 2017; Testa and D'Amato, 2017). In this study, corporate financial performance is evaluated based on the profitability of implementing the proposed strategies, particularly the potential energy savings calculated using NPV. NPV is a financial metric commonly employed to evaluate the total value of an investment while considering the present value of future cash flows compared to the initial capital cost (Hou et al., 2023).

Commonly used methodologies to calculate the NPV of sustainability strategies include Cost-Benefit Analysis (CBA) and Life Cycle Costing (LCC). These well-established methods have been utilized since the early 20th century (Brent, 2009; Ness et al., 2007). CBA and LCC evaluate the economic returns of an investment project and product lifecycle, respectively. However, these methodologies lack the dimensions to account for the intangible (social and environmental) benefits of a project or product. The global emphasis on just and sustainable development has led to the emergence of supplemental methodologies. Conventional CBA (fCBA) now includes environmental CBA (eCBA) and social CBA (sCBA), while conventional LCC (fLCC) includes environmental LCC (eLCC) and social LCC (sLCC) (Padilla-Rivera et al., 2023). Despite these variations, their isolated evaluation of the sustainability pillars indicates a need for integrated economic assessments. Categorization of indicators for these evaluation tools are shown in Fig. 3 (Carlos et al., n.d.; Ghagare et al., 2017; Hoogmartens et al., 2014). Ultimately, NPV remains the main metric of economic impact evaluation for both methodologies. Table 3 illustrates the application of the CBA and LCC methods to identify the period of evaluation and discount rate.

This paper introduces the ROSI method developed by the Stern Center for Sustainable Business. In contrast to CBA and LCC, the ROSI methodology offers a comprehensive approach to quantify the financial benefits of sustainability initiatives (Tracy et al., 2019a). ROSI evaluates the financial viability of sustainability initiatives by integrating the triple-bottom-line benefits – financial, environmental, social, and governance into a single framework. This integrated approach distinguishes ROSI from traditional CBA and LCC methodologies. The ROSI framework uses the unit value of money to quantify returns, making it a powerful investment decision-making tool for stakeholders. Businesses that embed sustainability measures yield benefits from mediating factors such as cost savings, revenue increases, and other financial gains. These mediating factors are quantified and monetized through site data collection or literature review. Fig. 3 shows the ROSI framework.

The ROSI methodology has been applied in various industries, including fashion (Rifkin and Raman, 2021), Brazilian beef supply chain (Tracy et al., 2019b), automotive (The Business Case for Implementing Sustainable Practices to Drive Financial Performance within the Automotive Sector, 2021), and energy (Eckerle and Whelan, 2020). The flexibility of the ROSI framework allows it to be applied at both micro and macro levels across different industries, ensuring reproducible outcomes. This standardization is an element that other economic evaluation methodologies lack. To substantiate the effectiveness of applying the ROSI method, this study employs the framework by Hoogmartens et al. (2014) to compare CBA, LCC, and ROSI using the introduced characteristics. Table 2 displays the comparison of these methods and their fulfillment of the criteria.

3.2. *Factors that motivate firms in conducting sustainability assessments*

The authors believe that to substantiate the adoption of the SA framework, it is essential to identify the enablers or factors that motivate the uptake of the framework. A multi-level strategy framework is essential for enabling the adoption of SA among companies. The authors identify several factors that may motivate firms to conduct a comprehensive SA.

Organizational factors play a crucial role in driving a holistic approach to sustainability adoption within companies. Implementing a robust capacity-building and reward system is essential for embedding sustainability into organizational practices. Regular sustainability

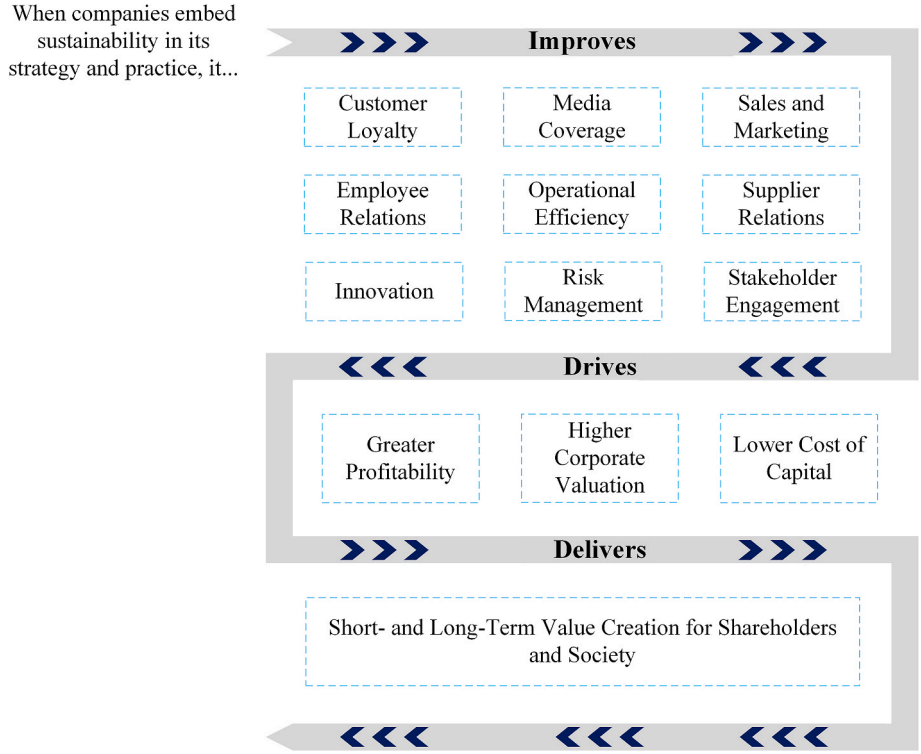

Fig. 3. Rositm framework (adopted from Tracy et al., 2019b).

training, integration of sustainability commitments into staff key performance indicators (KPIs), and the introduction of staff sustainability awards are effective methods. Çimşir and Uzunboylu (2019) and Holfelder (2019) have shown that continuous dissemination of sustainability information improves awareness and literacy among employees. However, ensuring that these measures translate into genuine commitment and behavior changes is challenging, as highlighted by Hussain et al. (2021). It is crucial to balance enforceable measures with cultivating a genuine commitment to sustainable values to drive long-term sustainability within organizations.

Forming a sustainability committee is another vital organizational factor. A dedicated sustainability committee oversees the corporate sustainability agenda, ensuring continuous improvement in sustainability practices and reporting (Bursa Malaysia & Global Compact Malaysia, 2021). Petrescu et al. (2020) noted that the formation of an independent sustainability committee positively correlates with the publication of high-quality annual sustainability reports. While merging sustainability committees with existing departments can enhance overall performance through expanded technical capabilities, it requires careful management to avoid overextending resources and compromising the quality of work (Kiesnere and Baumgartner, 2019). Continuous evaluation of the committee's effectiveness is essential to ensure it remains transformative rather than symbolic (Zhivkova, 2022).

Integrating corporate sustainability into human resource management by including net-zero and sustainability clauses in the employment handbook articulates organizational sustainability values to staff (Casey and Sieber, 2016; Faisal, 2023). The effectiveness of this initiative depends on its resonance with employees and support from the human resource department (Mazur and Walczyna, 2020). A balanced and engaging narrative in the handbook can increase a sense of ownership and promote the voluntary adoption of sustainability practices, enhancing overall corporate sustainability.

Expanding a company's technical capacity is also crucial for effective SA performance. Implementing an integrated data management system ensures the reliability and completeness of SA outcomes (Dibsi and Cho, 2023). However, companies may face challenges related to the costs and complexities of such systems (Khan et al., 2022). Effective data management supports the verification and validation of assessment results, facilitating certification processes as recommended by ISO 14604-3 (International Organization for Standardization, 2019).

Creating standardized guidelines and handbooks harmonizes sustainability reporting practices. While standardization can lead to oversimplification, it provides essential benchmarks for companies to meet minimum sustainability reporting requirements (Kosorić et al., 2021; Lisin et al., 2022). Simplified guidelines, such as the Simplified ESG Disclosure Guide, are particularly beneficial for small and medium enterprises (SME) embarking on their sustainability reporting journey (Capital Markets Malaysia & Securities Commission Malaysia, 2023).

Collaboration with universities can significantly enhance the technical capacity of companies. The triple helix theory, introduced in the 1980s, emphasizes the collaboration between industry, government, and academia to drive innovation and technological (C. Zhou and Etzkowitz, 2021). Structured industry-university collaborations benefit both parties, providing companies with access to scientific development and infrastructure facilities while offering universities job opportunities and skill development for students (Burbridge and Morrison, 2021; Ranga and Etzkowitz, 2013). Such collaborations facilitate the transfer of technology and innovation from academia to industry, improving the quality of SA outcomes (Silva et al., 2022).

Financial stimuli also play a crucial role in promoting sustainability adoption. Studies have shown that companies committed to disclosing sustainability performance and publishing sustainability reports gain a market advantage, leading to improved profitability (Dewi and Pinem, 2023; Farisa Caesaria and Basuki, 2017). The ROSI framework suggests that implementing sustainability measures can enhance brand reputation and customer loyalty, directly increasing revenue and profit creation. Increased profitability from sustainability investments can create a positive feedback loop, driving continuous sustainability performance improvements (Guo et al., 2020a).

Government-distributed capital allowances and incentives for sustainability reporting encourage broad participation, especially among SMEs (Khanchel and Lassoued, 2022). The effectiveness of these incentives depends on their scale and alignment with actual reporting costs, necessitating periodic policy revisions (Guo et al., 2020b). The Corporate Sustainability Reporting Directive introduced by the European Commission in 2023 mandates sustainability reporting for large entities and SMEs, with various European countries offering tax allowances and grants to support compliance (Corporate Sustainability Reporting Directive, 2023).

Financial incentives from banks and insurance providers also drive corporate sustainability. The introduction of the Climate Change and Principle-based Taxonomy by the Central Bank of Malaysia (2021) underscores the importance of sustainability in financial evaluations. Governments also offer green schemes, such as the Green Investment Tax Allocation and Green Investment Tax Exemption, to support companies purchasing green technology (Malaysia Green Technology Corporation, 2023). The 2023 Malaysian National Budget includes a Sustainable Development Funding Scheme, providing RM1.5 billion in funding for companies committed to sustainability.

Policy and regulations are powerful tools for enforcing sustainability adoption. Mandating sustainability reporting can significantly influence companies to adopt sustainable practices. However, the success of such mandates depends on robust enforcement mechanisms, clear guidelines, and financial support (Bergmann and Posch, 2018; Hummel and Rötzel, 2019). In Malaysia, sustainability reporting has been mandatory for public listed companies since 2015, with continuous improvements in reporting requirements (Ernst & Young Malaysia, 2023). Linking sustainability reporting to financial market requirements aligns with the evolving landscape of corporate accountability and drives corporate value (Susi Wardhani et al., 2022).

The adoption of SA frameworks is facilitated by addressing organizational factors, expanding technical capacity, leveraging financial stimuli, and enforcing supportive policies and regulations. These enablers create a conducive environment for companies to integrate sustainability into their core business practices, driving long-term sustainability performance.

4. Results

The theoretical SA framework and multi-level framework for SA adoption developed based on past studies and existing guidelines presents a modular and flexible approach to act as a benchmark for companies to design more specific methodologies.

4.1. Theoretical sustainability assessment framework for KLCC

The conceptual framework developed in this study builds upon a comprehensive literature review, incorporating global best practices and methodologies to enhance SA. This framework introduces several key improvements that address gaps in existing models, providing a more robust and effective approach to sustainability evaluation.

The framework adopts an integrated approach that simultaneously considers environmental, economic, and social dimensions of sustainability. Traditional frameworks often evaluate these pillars in isolation, leading to an incomplete understanding of the overall impact of sustainability initiatives. By integrating these dimensions, the framework offers a holistic assessment, allowing organizations to comprehensively understand the benefits and trade-offs of their sustainability practices (Sala et al., 2015). Flexibility and adaptability are also significant features of the framework. Unlike existing models that are often rigid and tailored to specific industries, this framework is designed to be modular and applicable across various organizational contexts. This flexibility

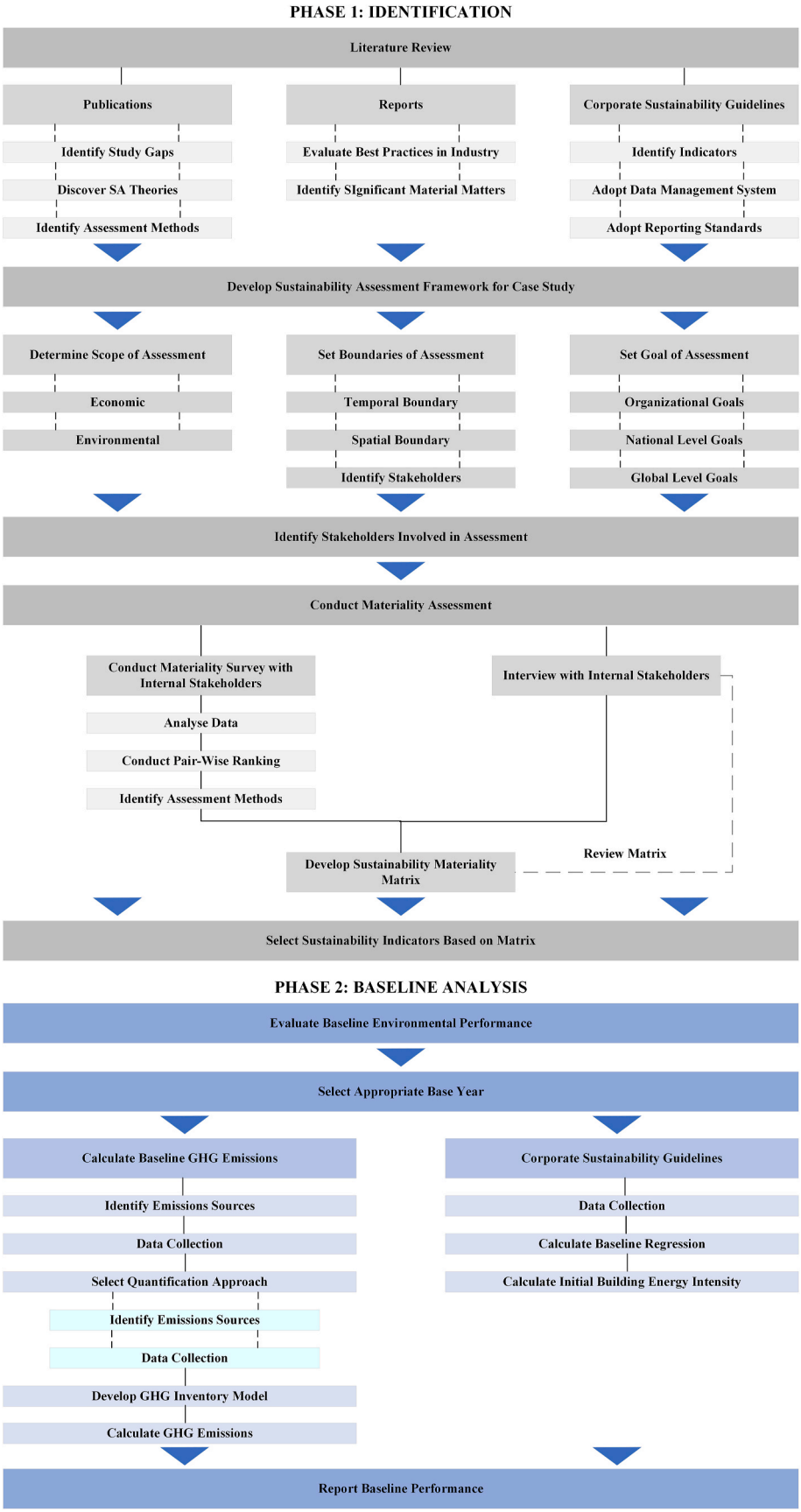

Fig. 4. Theoretical SA framework (source: Authors).

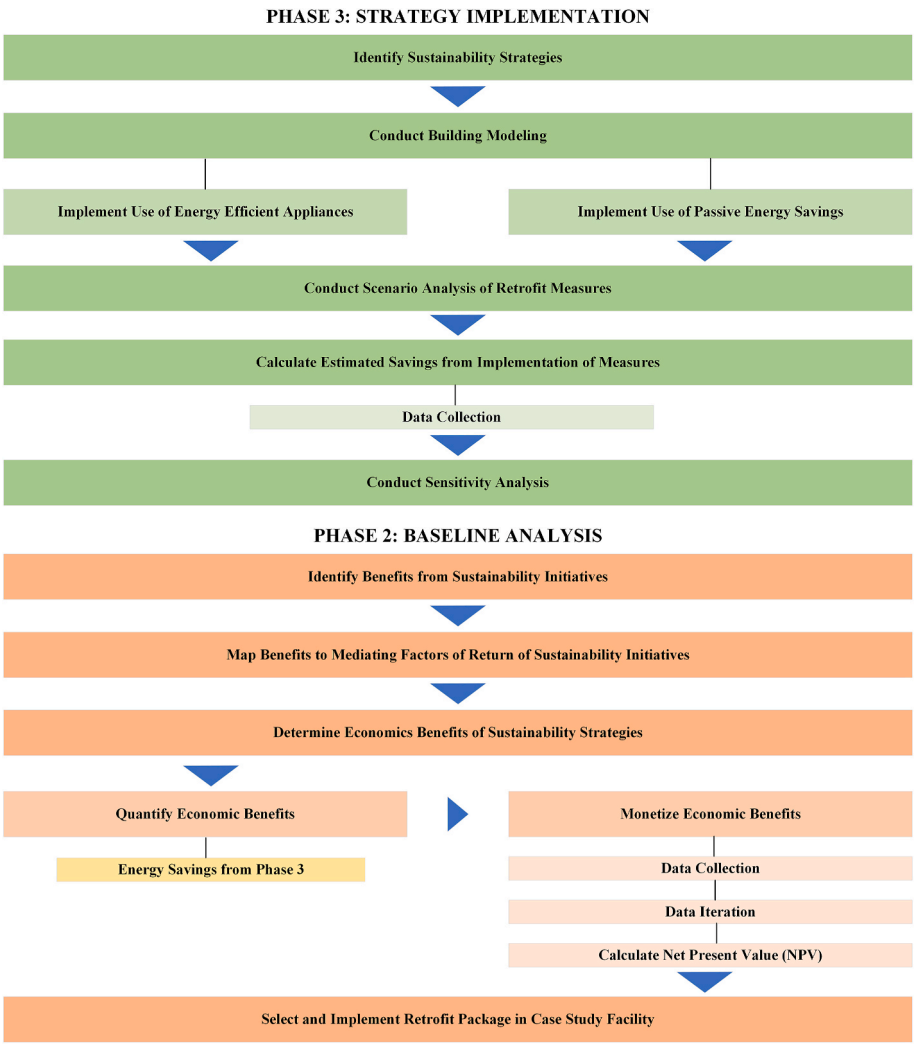

Fig. 4. (*continued*).

allows companies to customize the framework to their specific needs, ensuring that the assessment remains relevant and effective regardless of the industry or organizational structure (Pranugrahaning et al., 2021).

A unique aspect of this framework is the incorporation of the ROSI methodology. This method provides a more comprehensive economic justification for sustainability initiatives by integrating financial, environmental, social, and governance benefits into a single evaluation process. Traditional methodologies like CBA and LCC often fail to capture the intangible benefits of sustainability practices, focusing primarily on direct financial returns (Brent, 2009). ROSI addresses this limitation by quantifying the financial returns of sustainability initiatives, providing a robust and holistic economic assessment (Tracy et al., 2019a).

Finally, the framework supports continuous improvement and adaptation, encouraging companies to refine their sustainability practices over time. This dynamic approach contrasts with static models that do not account for evolving sustainability challenges and opportunities. By fostering ongoing assessment and refinement, the framework ensures that companies remain responsive to new sustainability insights and best practices (Kiesnere and Baumgartner, 2019). This conceptual framework represents a significant advancement over existing models by offering an integrated, flexible, and economically justified approach to sustainability assessment. It addresses current gaps and provides practical tools for real-world implementation, ensuring that companies can effectively measure and improve their sustainability performance. This innovative framework is designed to drive more comprehensive and impactful sustainability practices across diverse organizational contexts, contributing to a more sustainable future. The framework is presented in Fig. 4.

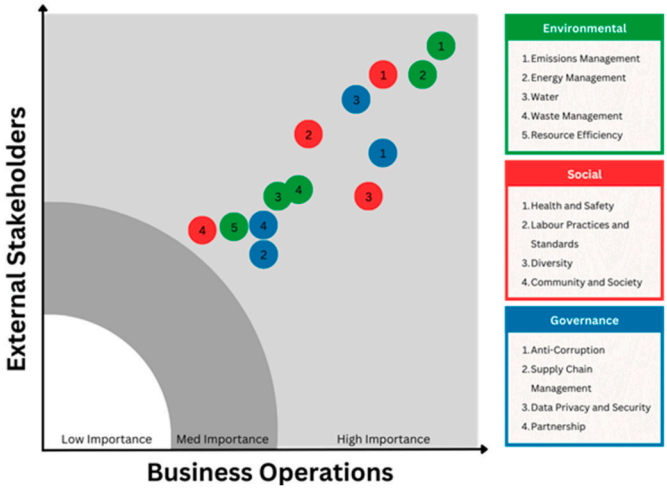

Fig. 5. Materiality matrix for KLCC.

4.2. Multi-level strategy framework for SA adoption

The multi-level strategy framework (Fig. 6) developed for SA adoption is designed with adaptability in mind, making it suitable for various scales and types of event and convention organizations (see Fig. 6). Its versatility is one of its key strengths, enabling its application to a wide range of events, from large-scale international conventions to smaller, local gatherings. For instance, in the context of a large-scale international convention, such as a global climate conference, the framework can guide organizers in implementing advanced sustainability measures. This could involve integrating renewable energy sources, such as solar panels, to power the venue, alongside comprehensive waste reduction strategies, including on-site composting and recycling. Additionally, the framework could facilitate the adoption of carbon offset programs to mitigate the environmental impact of international attendees' travel. Digital platforms could also be leveraged to encourage virtual participation, further minimizing the event's carbon footprint.

In contrast, when applied to a smaller-scale local event, such as a community workshop or a local trade show, the framework demonstrates its adaptability by offering a simplified approach tailored to the event's more modest resources and budget. Organizers could focus on achievable sustainability goals, such as using energy-efficient lighting, promoting waste segregation, and encouraging digital communications to reduce paper usage. These fundamental practices allow even small-scale events to contribute meaningfully to broader sustainability objectives, with the potential to scale up these efforts in future iterations.

Moreover, the framework's adaptability extends to various types of events, each presenting unique sustainability challenges and opportunities. For example, in the case of a conference or trade show, the framework might recommend detailed energy management practices, such as optimizing HVAC systems for energy efficiency and implementing stringent waste reduction protocols, like banning single-use

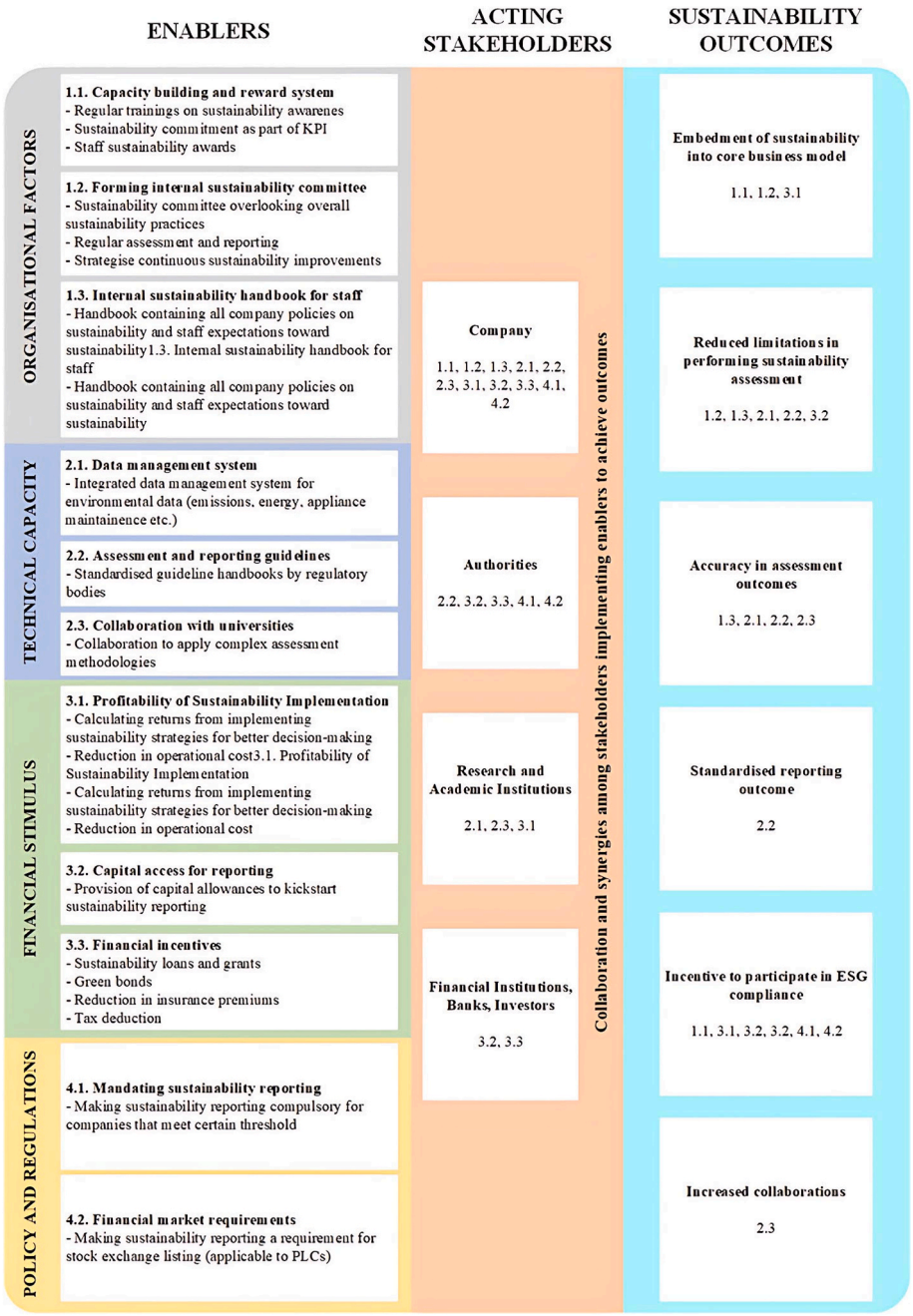

Fig. 6. Multi-level strategy framework for SA adoption.

plastics and providing reusable alternatives. Additionally, the framework could guide the organization of workshops on sustainability practices for exhibitors and attendees, embedding sustainability into the core of the event.

On the other hand, for events like exhibitions or corporate meetings, where logistics and space utilization are key considerations, the framework could emphasize the importance of sustainable venue selection. This might involve choosing locations with strong sustainability credentials or LEED certification. Furthermore, eco-friendly transportation options could be prioritized, such as organizing shuttle services using electric vehicles or encouraging carpooling among attendees, to reduce the event's overall carbon footprint.

Stakeholder engagement and collaboration are integral to the framework, fostering a collective commitment to sustainability across all parties involved in an event. For instance, in a large convention, venue managers could work closely with event planners and suppliers to implement a comprehensive sustainability plan, sourcing locally-produced, sustainable materials for event setups. In smaller events, organizers might engage local communities and businesses to source sustainable products and services, thereby strengthening local sustainability efforts.

To maintain its relevance, the framework includes mechanisms for continuous improvement and feedback. This allows organizations to regularly assess their performance, identify areas for improvement, and adjust their strategies accordingly. Such a dynamic approach ensures that the framework remains effective in addressing evolving sustainability challenges and industry standards, making it a robust and valuable tool across different scales and types of events.

4.3. Materiality assessment of case study application

To strengthen the practical application and relevance of our proposed sustainability adoption (SA) framework, we conducted a comprehensive materiality assessment on the case study, KLCC. This assessment aimed to identify and prioritize the key environmental, social, and governance (ESG) issues that are most significant to industry stakeholders and which align with the strategic goals of sustainability adoption.

The results of the materiality assessment, depicted in the Figure 5, clearly highlight the issues of highest importance across the ESG dimensions. In the Environmental category, Emissions Management and Energy Management were identified as the top priorities, reflecting their critical role in reducing carbon footprints and enhancing operational efficiency. Thus, the following Phases 2, 3, and 4 of the framework focuses on evaluating these indicators within KLCC. Similarly, in the Social category, Health and Safety emerged as a significant concern, underlining the industry's commitment to ensuring the well-being of employees and surrounding communities. From a Governance perspective, Anti-Corruption and Data Privacy and Security were deemed crucial, highlighting the importance of maintaining ethical standards and safeguarding sensitive information.

The assessment provides empirical support for the SA framework by demonstrating its alignment with industry priorities. This alignment is crucial for the practical implementation of the framework, as it ensures that the strategies developed are not only theoretically sound but also address the real-world challenges and expectations faced by industry practitioners. Moreover, the materiality matrix underscores the need for targeted interventions in areas of high importance, which the SA framework is well-equipped to address.

By integrating these materiality assessment findings into the framework, we offer a more robust and grounded approach that industry practitioners can readily adopt. This empirical evidence enhances the framework's applicability and underscores its potential to drive tangible, positive outcomes in the areas of environmental management, social responsibility, and governance practices.

5. Policy implications

As established in the introduction, the purpose of this study is to integrate and synthesize previous work within the sustainability science discipline. An SA framework was developed by consolidating best practices, providing a comprehensive and robust tool to evaluate the ecological, social, and economic impacts of diverse corporate sustainability initiatives within the events and convention industry. To further fortify the foundation of the framework, a multi-level strategy framework to enable increased adoption of sustainability reporting among companies in Malaysia was formed. The intricate work conducted in this study closely considered the macro application of the framework, examining the implications of the research for local policy.

5.1. Proactive preparation for the enactment of Carbon Tax

As introduced in the New Industrial Master Plan 2030; Ministry of Investment Trade and Industry (2023), the local government will be introducing a nationwide Carbon Tax in early 2025 indicating that companies will then be mandated to maintain a continuous GHG inventory. The developed framework in this study adopted the standard procedure of conducting a GHG Measurement, Reporting, and Validation (MRV) process as recommended by the International Organization for Standardization (2018) and the GHG Protocol Standard (Sotos, 2015) which are world-class standards for GHG accounting. By adopting the developed framework, companies will be able to conduct a GHG inventory while also working towards obtaining an ISO 14604-1 certification. Simply put, the developed framework will enable companies to obtain two outcomes – a robust GHG inventory and certification provided they comply with the framework strictly and are willing to allocate the additional certification costs. Phase 2 of the developed framework also supports the implementation of the local Carbon Tax considering that conducting an MRV is the initial step in complying with the Carbon Tax as practiced by the European Commission, Singapore, and China.

5.2. Industry readiness for the implementation of a mandatory carbon market

The implementation of a mandatory carbon market has become a global focus recently given that it is mandated in Article 6 of The Paris Agreement. Article 6 of the Paris Agreement outlines the importance of joint efforts in regulating GHG emissions to attain country-specific NDCs through the employment of emission trading schemes (Conference of Parties at the United Nations Climate Change Conference, 2016). As practiced by nations in Europe (Greenhouse Gas Emission Allowance Trading within M9 Union, 2003), a mandatory carbon market was introduced by employing a cap-and-trade system in which companies are given an allowance to emit carbon annually. Underperformers are then required to trade with other companies that stay below their allowance cap. The amount of allowance is reduced periodically every year. An integral element of the cap-and-trade system is that it requires companies to maintain a GHG inventory throughout an operating year to monitor their compliance with the allocated carbon allowance (Monitoring and Reporting of Greenhouse Gas Emissions, 2018). Phase 2 of the developed framework in this study was built upon the premise of ensuring industry readiness for when the government introduces a mandatory carbon market. By adopting the framework, companies will be able to remain proactive for new policies while subsequently being vigilant regarding their emissions for better environmental stewardship.

5.3. Enhanced compliance with green building standards

In Phase 3 of the developed framework, this study introduced two types of energy-focused sustainability strategies to be incorporated within the events and convention or building industries which are the

active and passive retrofits. The proposal of passive retrofits such as building envelope retrofits considered the enactment of Malaysia Uniform Building By-Laws (1984) by the local government (Ministry of Housing and Local Government, 2022). According to this bill, buildings in Malaysia are to maintain an OTTV of 50 W/m2 or below. Thus, Phase 3 of the framework proposes the implementation of both active and passive retrofits to ensure that sustainability outcomes produce both environmental uplift and compliance with local laws. In the multilevel strategy framework, this study proposes collaboration and synergy among stakeholders to drive better more systematic adoption of sustainability. Companies may consider collaborating with universities and research institutions to substantiate their sustainability strategies ensuring that the implementation is backed by research and accurately complies with the law.

5.4. Augmentation of sustainability reporting requirements to include non-listed private companies

As part of the financial market requirement, publicly listed companies are mandated by law to produce a sustainability report as a requirement to be listed on the stock exchange (Bursa Malaysia, 2023). The introduction of the framework in this study intends to contribute to the augmentation of this requirement by providing SMEs with a means of participating in ESG compliance. The development of the framework was based on producing a user-centric and simplified step-by-step process for conducting an SA. The strategy framework acts as a substantiate element to provide industry players with a framework to navigate through the sustainability discipline. The introduction of the Simplified ESG Disclosure Guide (Capital Markets Malaysia & Securities Commission Malaysia, 2023) in Malaysia is an indication that the sustainability reporting requirement is further enhanced to place this requirement on non-listed companies. Although the framework presented seems simplified, the adoption of the framework by companies will enable them to conduct a systematic SA which in result may aid them in obtaining environmental-related certifications which as a result will improve their market reputation and standing. For example, in Malaysia, PLCs that demonstrate commendable sustainability performance are ranked high in the FTSE4Good Index by Bursa Malaysia. This indexing system is one of the main points of reference for banks and insurers before extending financial assistance.

6. Conclusion

In summary, the culmination of this study brings forth a comprehensive synthesis of theoretical advancements, methodological refinements, and a groundbreaking multilevel strategy framework to enable corporate sustainability adoption. These multifaceted contributions integrate to present a more comprehensive insight into the dynamic sustainability science discipline and set the foundation for practical applications in heterogeneous industries.

6.1. Theoretical advancements and critical analysis of existing SA field

The execution of an extensive literature review done in this study was purposed to propel theoretical advancements and critical analyses within the evolving sustainability landscape. A comprehensive review of existing frameworks and methodologies done in this study contributes to a simplified and condensed understanding of the complexities surrounding SAs. By adopting industry best practices in navigating the elements of a complete cycle of a SA, this study presents a holistic and user-centric approach to corporate SA for the event and convention industry. However, this presents a limitation in generalizability. Furthermore, the framework developed in this study only included two pillars of sustainability which are environmental and economic to maintain conservativeness in appraising the sustainability performance of the company. Future studies must maintain an upward commitment to continuously explore sustainability science as it is a dynamic field.

6.2. Methodological improvements of economic impact analyses

The integration of an economic impact analysis in the developed framework presents a novel approach to further advancing corporate SAs. In previous studies, an SA does not usually assimilate an economic impact assessment and is done only once before a sustainability project is undertaken. This study presents the importance of quantifying the economic benefits of implementing sustainability measures from the triple-bottom-line perspective. The chosen methodology, ROSI™ has been proven to be a standardized and holistic approach to evaluating the returns of sustainability measures through the mediating factors as compared in Table 2. The unique attribute of the methodology enables companies to quantify the triple-bottom-line economic benefits as a package without having to separate the benefits based on the sustainability pillars as compared to the CBA and LCC.

6.3. Practical application of SA framework

The practical application of the SA framework developed in this research is supported by the development of a multilevel strategy framework designed to facilitate sustainability adoption among companies. These two frameworks are not only theoretical constructs but are intended to serve as actionable tools for industries, governments, universities, and research institutions, bridging the gap between theory and real-world application.

For industry practitioners, the implementation of these frameworks offers a structured approach to systematically designing sustainability assessments (SA) while adhering to rigorous scientific practices, policies, and globally recognized standards. Specifically, companies can use these frameworks to identify key sustainability indicators, align them with organizational goals, and integrate them into their operational strategies. This process involves translating abstract sustainability concepts into concrete actions, such as energy efficiency measures, waste reduction programs, and socially responsible supply chain practices.

However, the implementation of these frameworks is not without challenges. Industry practitioners may face difficulties in customizing the frameworks to fit the unique needs of their organizations, particularly in industries with complex supply chains or diverse stakeholder interests. Additionally, the alignment of sustainability goals with existing business objectives can be challenging, requiring a careful balancing act between short-term profitability and long-term sustainability.

Moreover, the adoption of these frameworks may require significant organizational change, including the development of new competencies, stakeholder engagement, and the integration of sustainability into corporate culture. Resistance to change, lack of resources, and insufficient expertise in sustainability practices are potential barriers that companies might encounter.

Therefore, while the SA and multilevel strategy frameworks offer valuable tools for advancing sustainability, successful implementation will depend on industry practitioners' ability to navigate these challenges. Future studies should continue to explore practical applications of sustainability frameworks, providing more detailed guidance and case studies to support industry practitioners in overcoming these obstacles and translating sustainability goals into tangible, positive outcomes for the environment, society, and the economy.

Funding

This work was supported by the National University of Malaysia (Industrial Grant) [RS-2023-002].

CRediT authorship contribution statement

Ilanur Elyssa Bart Aswain: Writing – review & editing, Writing –

original draft, Software, Methodology, Investigation, Conceptualization. **Norasikin Ahmad Ludin:** Supervision, Project administration, Funding acquisition. **Hasila Jarimi:** Writing – review & editing, Supervision, Methodology. **Kathleen L. Purvis-Robert:** Supervision. **Norul Hisham Hamid:** Methodology. **Mohd Zulkifly Mohd Shariff:** Methodology. **John Burke:** Methodology.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Norasikin Ahmad Ludin reports financial support was provided by National University of Malaysia Solar Energy Research Institute. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

Acknowledgment

We would like to thank Ilanur Esmyn Bart for proofreading this article. We also thank all authors cited in this paper for the development of the frameworks presented in this paper.

References

Akter, S., Kabir, H., Akhter, S., Hasan, Md M., 2021. Assessment of environmental impact and economic viability of domestic biogas plant technology in Bangladesh. J. Sustain. Dev. 14 (5), 44. https://doi.org/10.5539/jsd.v14n5p44.

Alghamdi, A., Haider, H., Hewage, K., Sadiq, R., 2019. Inter-university sustainability benchmarking for Canadian higher education institutions: water, energy, and carbon flows for technical-level decision-making. Sustainability 11 (9). https://doi.org/10.3390/su11092599.

Alshehhi, A., Nobanee, H., Khare, N., 2018. The impact of sustainability practices on corporate financial performance: literature trends and future research potential. Sustainability 10 (Issue 2). https://doi.org/10.3390/su10020494. MDPI.

Anderson, R.C., 2010. Berkshire encyclopedia of sustainability. https://doi.org/10.1093/acref/9780190622664.001.0001.

Arioli, M.S., D'Agosto, M.de A., Amaral, F.G., Cybis, H.B.B., 2020. The evolution of city-scale GHG emissions inventory methods: a systematic review. Environ. Impact Assess. Rev. 80. https://doi.org/10.1016/j.eiar.2019.106316. Elsevier Inc.

Arroyo, P., 2017. A new taxonomy for examining the multi-role of campus sustainability assessments in organizational change. J. Clean. Prod. 140, 1763–1774. https://doi.org/10.1016/j.jclepro.2015.08.100.

Barrow, M., Buckley, B., Caldicott, T., Cumberlege, T., Hsu, J., Kaufman, S., Ramm, K., Rich, D., Temple-Smith, W., Cummis, C., Draucker, L., Khan, S., Ranganathan, J., Soto, M., 2013. Technical guidance for calculating scope 3 emissions - supplement to the corporate value chain (scope 3) accounting & reporting standard. https://ghgprotocol.org/scope-3-calculation-guidance-2.

Bellantuono, N., Pontrandolfo, P., Scozzi, B., 2016. Capturing the stakeholders' view in sustainability reporting: a novel approach. Sustainability 8 (4). https://doi.org/10.3390/su8040379.

Bergmann, A., Posch, P., 2018. Mandatory sustainability reporting in Germany: does size matter? Sustainability 10 (11). https://doi.org/10.3390/su10113904.

Berry-Stölzle, T.R., Xu, J., 2018. Enterprise risk management and the cost of capital. J. Risk Insur. 85 (1), 159–201. https://doi.org/10.1111/jori.12152.

Brent, Robert J., 2009. Cover Handbook of Research on Cost–Benefit Analysis Handbook of Research on Cost–Benefit Analysis. Edward Elgar Publishing Limited. https://www.elgaronline.com/.

Burbridge, M., Morrison, G.M., 2021. A systematic literature review of partnership development at the university–industry–government nexus. Sustainability 13 (24). https://doi.org/10.3390/su132413780. MDPI.

Bursa Malaysia, 2023. Bursa listing requirements. https://www.bursamalaysia.com/regulation/listing_requirements/main_market/listing_requirements.

Bursa Malaysia, & Global Compact Malaysia, 2021. Corporate sustainability practitioner (CSP) competency framework 2021. https://bursasustain.bursamalaysia.com/competency-framework.

Büyüközkan, G., Karabulut, Y., 2018. Sustainability performance evaluation: literature review and future directions. J. Environ. Manag. 217, 253–267. https://doi.org/10.1016/j.jenvman.2018.03.064.

Cai, S., Gou, Z., 2024. Impact of COVID-19 on the energy consumption of commercial buildings: a case study in Singapore. Energy and Built Environment 5 (3), 364–373. https://doi.org/10.1016/j.enbenv.2022.11.004.

Cai, B., Lu, J., Wang, J., Dong, H., Liu, X., Chen, Y., Chen, Z., Cong, J., Cui, Z., Dai, C., Fang, K., Feng, T., Guo, J., Li, F., Meng, F., Tang, W., Wang, G., Xie, Y., Zhang, J., 2019. A benchmark city-level carbon dioxide emission inventory for China in 2005. Appl. Energy 233–234, 659–673. https://doi.org/10.1016/j.apenergy.2018.10.016.

Capital Markets Malaysia, & Securities Commission Malaysia, 2023. Simplified ESG disclosure guide. https://sedg.capitalmarketsmalaysia.com/wp-content/uploads/2023/10/SEDG-Full-Guide.pdf.

Carlos, R. L., Aparecida De Mattos, C., Mattos, C. A., & Carlos, ; (n.d.). Environmental Life Cycle Costing (ELCC) as a Decision-Making Tool for Materials Selection. https://www.researchgate.net/publication/359069185.

Casey, D., Sieber, S., 2016. Employees, sustainability and motivation: increasing employee engagement by addressing sustainability and corporate social responsibility. Research in Hospitality Management 6 (1), 69–76. https://doi.org/10.2989/rhm.2016.6.1.9.1297.

Castillo-Merino, D., Rodríguez-Pérez, G., 2021. The effects of legal origin and corporate governance on financial firms' sustainability performance. Sustainability 13 (15). https://doi.org/10.3390/su13158233.

Central Bank of Malaysia, 2021. Climate change and principle-based taxonomy. https://www.bnm.gov.my/-/climate-change-principle-based-taxonomy.

Chang, R.D., Zuo, J., Zhao, Z.Y., Zillante, G., Gan, X.L., Soebarto, V., 2017. Evolving theories of sustainability and firms: history, future directions and implications for renewable energy research. Renew. Sustain. Energy Rev. 72, 48–56. https://doi.org/10.1016/j.rser.2017.01.029. Elsevier Ltd.

Çimşir, B.T., Uzunboylu, H., 2019. Awareness training for sustainable development: development, implementation and evaluation of a mobile application. Sustainability 11 (3). https://doi.org/10.3390/su11030611.

Clark, S.S., Miles, M.L., 2021. Assessing the integration of environmental justice and sustainability in practice: a review of the literature. Sustainability 13 (Issue 20). https://doi.org/10.3390/su132011238. MDPI.

Conference of Parties at the United Nations Climate Change Conference, 2016. The Paris Agreement. In: Corporate Sustainability Reporting Directive, Pub. L. No. 537/2014" title="https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7- Corporate Sustainability Reporting Directive, Pub. L. No. 537/2014">https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7- Corporate Sustainability Reporting Directive, Pub. L. No. 537/2014. Official Journal of the European Union, 2023. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022L2464.

Corporate Sustainability Reporting Directive, 2023. Pub. L. No. 537/2014. Off. J. Euro. Union. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022L2464.

Dal Mas, F., Massaro, M., Lombardi, R., Garlatti, A., 2019. From output to outcome measures in the public sector: a structured literature review. Int. J. Organ. Anal. 27 (5), 1631–1656. https://doi.org/10.1108/IJOA-09-2018-1523. Emerald Group Holdings Ltd.

Dewi, I.E., Pinem, D., 2023. The effect of application of sustainable development goals (SDGs) and sustainability report on company profitability. International Research Journal of Economics and Management Studies 2 (1). https://doi.org/10.56472/25835238/IRJEMS-V2I1P117.

Dibsi, J., Cho, J., 2023. Data management for environmentally sustainable and profitable business: evidence from the food retail industry. Sustainability 15 (23), 16298. https://doi.org/10.3390/su152316298.

Ding, T., Bourrelly, S., Achten, W.M.J., 2021. Application of territorial emission factors with open-access data—a territorial LCA case study of land use for livestock production in Wallonia. Int. J. Life Cycle Assess. 26 (8), 1556–1569. https://doi.org/10.1007/s11367-021-01949-3.

Donnelly, A., Jones, M., O'Mahony, T., Byrne, G., 2007. Selecting environmental indicator for use in strategic environmental assessment. Environ. Impact Assess. Rev. 27 (2), 161–175. https://doi.org/10.1016/j.eiar.2006.10.006.

Eckerle, K., Whelan, T., 2020. Using the return on sustainability investment (ROSI) framework to value accelerated decarbonization. Bank Am. J. Appl. Corp. Finance 167, 1–11. https://doi.org/10.1016/j.ijpe.2015.05.018.

Efficiency Valuation Organization, 2022. International performance measurement and verification protocol. https://evo-world.org/en/products-services-mainmenu-en/protocols/ipmvp.

Ernst & Young Malaysia, 2023. Bursa Malaysia: enhanced sustainability disclosure requirements. https://www.ey.com/en_my/take-5-business-alert/bursa-malaysia-enhanced-sustainability-disclosure-requirements.

Events Industry Council, 2023. 2023 Global Economic Significance of Business Events file:///C:/Users/ADMIN/Downloads/EIC%20ESS%20Executive%20Summary.pdf.

Ewa Latawiec, A., Garrett, R., 2015. What are sustainability indicators for?. In: Sustainability Indicators in Practice. De Gruyter, pp. 12–22. https://doi.org/10.1515/9783110450507-006.

Faisal, S., 2023. Green human resource management—a synthesis. Sustainability 15 (Issue 3). https://doi.org/10.3390/su15032259. MDPI.

Farias, G., Farias, C., Krysa, I., Harmon, J., 2020. Sustainability mindsets for strategic management: lifting the yoke of the neo-classical economic perspective. Sustainability 12 (7). https://doi.org/10.3390/SU12176977.

Farisa Caesaria, A., Basuki, B., 2017. The study of sustainability report disclosure aspects and their impact on the companies' performance. SHS Web of Conferences. https://doi.org/10.1051/shsconf/20173408001.

Farooq, M.B., Zaman, R., Sarraj, D., Khalid, F., 2021. Examining the extent of and drivers for materiality assessment disclosures in sustainability reports. Sustainability Accounting, Management and Policy Journal 12 (5), 965–1002. https://doi.org/10.1108/SAMPJ-04-2020-0113.

Franzoni, E., Volpi, L., Bonoli, A., 2020. Applicability of life cycle assessment methodology to conservation works in historical building: the case of cleaning. Energy Build. 214. https://doi.org/10.1016/j.enbuild.2020.109844.
Fregonara, E., Giordano, R., Ferrando, D.G., Pattono, S., 2017. Economic-environmental indicators to support investment decisions: a focus on the buildings' end-of-life stage. Buildings 7 (3). https://doi.org/10.3390/buildings7030065.
Garst, J., Maas, K., Suijs, J., 2022. Materiality assessment is an art, not a science: selecting ESG topics for sustainability reports. Calif. Manag. Rev. 65 (1), 64–90. https://doi.org/10.1177/00081256221120692.
Ghafourian, M., Nika, C.E., Mousavi, A., Mino, E., Al-Salehi, M., Katsou, E., 2022. Economic impact assessment indicators of circular economy in a decentralised circular water system — case of eco-touristic facility. Sci. Total Environ. 822. https://doi.org/10.1016/j.scitotenv.2022.153602.
Ghagare, S.D., Suryawanshi, Prof A.S., Jadhav, V.D., 2017. Life cycle cost methodology for mixers based on MTTF life cycle cost model. IARJSET 4 (1), 16–19. https://doi.org/10.17148/iarjset/ncdmete.2017.05.
Gholami, H., Nils Røstvik, H., Manoj Kumar, N., Chopra, S.S., 2020. Lifecycle cost analysis (LCCA) of tailor-made building integrated photovoltaics (BIPV) façade: solsmaragden case study in Norway. Sol. Energy 211, 488–502. https://doi.org/10.1016/j.solener.2020.09.087.
Greenhouse Gas Emission Allowance, 2003. Directive 2003/87/EC. p3-9.Trading within M9 union, pubL. No. 02003L0087. Off. J. Eur. Union. https://eur-lex.europa.eu/legal-content/en/LSU/?uri=CELEX:32003L0087.
Guo, A., Wei, H., Zhong, F., Liu, S., Huang, C., 2020a. Enterprise sustainability: economic policy uncertainty, enterprise investment, and profitability. Sustainability 12 (9). https://doi.org/10.3390/su12093735.
Guo, A., Wei, H., Zhong, F., Liu, S., Huang, C., 2020b. Enterprise sustainability: economic policy uncertainty, enterprise investment, and profitability. Sustainability 12 (9). https://doi.org/10.3390/su12093735.
Gustavsson, L., Piccardo, C., 2022. Cost optimized building energy retrofit measures and primary energy savings under different retrofitting materials, economic scenarios, and energy supply. Energies 15 (3). https://doi.org/10.3390/en15031009.
Han, X., Liang, Y., Ai, Y., Li, J., 2018. Economic evaluation of a PV combined energy storage charging station based on cost estimation of second-use batteries. Energy 165, 326–339. https://doi.org/10.1016/j.energy.2018.09.022.
Hekrle, M., Liberalesso, T., Macháč, J., Matos Silva, C., 2023. The economic value of green roofs: a case study using different cost–benefit analysis approaches. J. Clean. Prod. 413. https://doi.org/10.1016/j.jclepro.2023.137531.
Hirvonen, J., Saari, A., Jokisalo, J., Kosonen, R., 2022. Socio-economic impacts of large-scale deep energy retrofits in Finnish apartment buildings. J. Clean. Prod. 368. https://doi.org/10.1016/j.jclepro.2022.133187.
Holfelder, A.K., 2019. Towards a sustainable future with education? Sustain. Sci. 14 (4), 943–952. https://doi.org/10.1007/s11625-019-00682-z.
Hoogmartens, R., Van Passel, S., Van Acker, K., Dubois, M., 2014. Bridging the gap between LCA, LCC and CBA as sustainability assessment tools. Environ. Impact Assess. Rev. 48, 27–33. https://doi.org/10.1016/j.eiar.2014.05.001. Elsevier Inc.
Hou, C., Huo, N., Wang, S., 2023. Comparative study of techno-economic evaluation methods: NPV and IRR as examples. BCP Business & Management ECRM 2022.
Hull, C.E., Rothenberg, S., 2008. Firm performance: the interactions of corporate social performance with innovation and industry differentiation. Strat. Manag. J. 29 (7), 781–789. https://doi.org/10.1002/smj.675.
Hummel, K., Rötzel, P., 2019. Mandating the sustainability disclosure in annual reports—evidence from the United Kingdom. Schmalenbach Business Review 71 (2), 205–247. https://doi.org/10.1007/s41464-019-00069-8.
Hussain, M., Hassan, H., Iqbal, Z., Niazi, A., Hoshino, Y., 2021. Moral awareness: a source of improved sustainable performance. Sustainability 13 (23). https://doi.org/10.3390/su132313077.
International Congress and Convention Association, 2018. 2018 ICCA statistics report: country & city rankings. www.iccaworld.org.
International Organization for Standardization, 2018a. Greenhouse Gases-Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals COPYRIGHT PROTECTED DOCUMENT.
International Organization for Standardization, 2018b. Greenhouse Gases-Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals COPYRIGHT PROTECTED DOCUMENT Published in Switzerland.
International Organization for Standardization, 2019. Greenhouse Gases-Part 3: Specification with Guidance for the Verification and Validation of Greenhouse Gas Statements COPYRIGHT PROTECTED DOCUMENT Published in Switzerland.
Khan, M.J., Ullah, F., Imran, M., Khan, J., Khan, A., AlGhamdi, A.S., Alshamrani, S.S., 2022. Identifying challenges for clients in adopting sustainable public cloud computing. Sustainability 14 (16). https://doi.org/10.3390/su14169809.
Khanchel, I., Lassoued, N., 2022. ESG disclosure and the cost of capital: is there a ratcheting effect over time? Sustainability 14 (15). https://doi.org/10.3390/su14159237.
Kiesnere, A.L., Baumgartner, R.J., 2019. Sustainability management in practice: organizational change for sustainability in smaller large-sized companies in Austria. Sustainability 11 (3). https://doi.org/10.3390/su11030572.
Kludaczalessandri, M., Cygańska, M., 2021. Corporate social responsibility and financial performance among energy sector companies. Energies 14 (19). https://doi.org/10.3390/en14196068.
Kosorić, V., Lau, S.K., Tablada, A., Bieri, M., Nobre, A.M., 2021. A holistic strategy for successful photovoltaic (Pv) implementation into Singapore's built environment. Sustainability 13 (11). https://doi.org/10.3390/su13116452.
Lee, S., Kim, J.H., 2020. Quantitative measure of sustainability for water distribution systems: a comprehensive review. Sustainability 12 (23), 1–19. https://doi.org/10.3390/su122310093.
León-Quismondo, J., García-Unanue, J., Burillo, P., 2020. Best practices for fitness center business sustainability: a qualitative vision. Sustainability 12 (12). https://doi.org/10.3390/su12125067.
Li, M., Wiedmann, T., Hadjikakou, M., 2019. Enabling full supply chain corporate responsibility: scope 3 emissions targets for ambitious climate change mitigation. Environ. Sci. Technol. https://doi.org/10.1021/acs.est.9b05245.
Lisin, A., Kushnir, A., Koryakov, A.G., Fomenko, N., Shchukina, T., 2022. Financial stability in companies with high ESG scores: evidence from north America using the ohlson O-score. Sustainability 14 (1). https://doi.org/10.3390/su14010479.
Lu, C., Li, W., 2019. A comprehensive city-level GHGs inventory accounting quantitative estimation with an empirical case of Baoding. Sci. Total Environ. 651, 601–613. https://doi.org/10.1016/j.scitotenv.2018.09.223.
Lütje, A., Wohlgemuth, V., 2020. Tracking sustainability targets with quantitative indicator systems for performance measurement of industrial symbiosis in industrial parks. Adm. Sci. 10 (1). https://doi.org/10.3390/admsci10010003.
Malaysia Government, 2022. Malaysia's update of its first nationally determined contribution. https://unfccc.int/documents/497775.
Malaysia Green Technology Corporation, 2023. Green investment tax allowance (GITA) and green income tax exemption (GITE) guideline. https://www.mgtc.gov.my/wp-content/uploads/2022/07/REC-GTGT-007-GUIDELINES-FOR-GREEN-TECHNOLOGY-TAX-INCENTIVE-GITAGITE.pdf.
Martín-Pascual, J., Fernández-González, J.M., Ceccomarini, N., Ordoñez, J., Zamorano, M., 2020. The study of economic and environmental viability of the treatment of organic fraction of municipal solid waste using Monte Carlo simulation. Appl. Sci. 10 (24), 1–12. https://doi.org/10.3390/app10249028.
Mata-Lima, H., Alvino-Borba, A., Akamatsu, K., Incau, B., Jard, J., da Silva, A.B., Morgado-Dias, F., 2016. Measuring an organization's performance: the road to defining sustainability indicators. Environ. Qual. Manag. 26 (2), 89–104. https://doi.org/10.1002/tqem.21487.
Matuszewska-Pierzynka, A., 2021. Relationship between corporate sustainability performance and corporate financial performance: evidence from U.S. companies JEL Classification: d24; F23; M14. Equilibrium. Quarterly Journal of Economics and Economic Policy 16. https://doi.org/10.24136/eq.2021.
Mazur, B., Walczyna, A., 2020. Bridging sustainable human resource management and corporate sustainability. Sustainability 12 (21), 1–21. https://doi.org/10.3390/su12218987.
McBrayer, G.A., 2018. Does persistence explain ESG disclosure decisions? Corp. Soc. Responsib. Environ. Manag. 25 (6), 1074–1086. https://doi.org/10.1002/csr.1521.
Meet Green, 2014. The environmental footprint of an event. https://meetgreen.com/wordpress/wp-content/uploads/2017/09/eventfoot.pdf.
Menichini, T., Salierno, G., 2023. Using materiality analysis to determine actual and potential company impacts on sustainable development. Eur. J. Sustain. Dev. 12 (2). https://doi.org/10.14207/ejsd.2023.v12n2p90.
Mikulić, D., Bakarić, I.R., Slijepčević, S., 2016. The economic impact of energy saving retrofits of residential and public buildings in Croatia. Energy Pol. 96, 630–644. https://doi.org/10.1016/j.enpol.2016.06.040.
Ministry of Housing and Local Government, 2022. G.N. 5178/84. p33-34. MALAYSIA UNIFORM BUILDING BY-LAWS 1984. https://jkt.kpkt.gov.my/sites/default/files/2022.10/UKBS201984201C.pdf.
Ministry of Investment Trade and Industry, 2023. New Industrial Master Plan 2030 978, 967-0020-04–4). https://www.nimp2030.gov.my/.
Mohamad Munir, Z.H., Ahmad Ludin, N., Junedi, M.M., Ahmad Affandi, N.A., Ibrahim, M.A., Mat Teridi, M.A., 2023. A rational plan of energy performance contracting in an educational building: a case study. Sustainability 15 (2), 1430. https://doi.org/10.3390/su15021430.
Monitoring and Reporting of Greenhouse Gas Emissions, 2018. Directive 2003/87/EC. p3-5. Pub. L. No. 02018R2066. Off. J. Euro. Union. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018R2066.
Moreira, J.M.L., Cesaretti, M.A., Carajilescov, P., Maiorino, J.R., 2015. Sustainability deterioration of electricity generation in Brazil. Energy Pol. 87, 334–346. https://doi.org/10.1016/j.enpol.2015.09.021.
Muñoz, I., Hernández, P., Pérez-Iribarren, E., Pedrero, J., Arrizabalaga, E., Hermoso, N., 2020. Methodology for integrated modelling and impact assessment of city energy system scenarios. Energy Strategy Rev. 32. https://doi.org/10.1016/j.esr.2020.100553.
Nawaz, W., Koç, M., 2019. Exploring organizational sustainability: themes, functional areas, and best practices. Sustainability 11 (16). https://doi.org/10.3390/su11164307. MDPI.
Ness, B., Urbel-Piirsalu, E., Anderberg, S., Olsson, L., 2007. Categorising tools for sustainability assessment. Ecol. Econ. 60 (Issue 3), 498–508. https://doi.org/10.1016/j.ecolecon.2006.07.023.
Nicoläescu, E., Alpopi, C., Zaharia, C., 2015. Measuring corporate sustainability performance. Sustainability 7 (1), 851–865. https://doi.org/10.3390/su7010851.
Padilla-Rivera, A., Hannouf, M., Assefa, G., Gates, I., 2023. A systematic literature review on current application of life cycle sustainability assessment: a focus on economic dimension and emerging technologies. In: Environmental Impact Assessment Review, 103. Elsevier Inc. https://doi.org/10.1016/j.eiar.2023.107268.
Perino, G., Jarke-neuert, J., Schenuit, F., Wickel, M., Zengerling, C., 2022. Closing the implementation gap: obstacles in reaching net-zero pledges in the EU and Germany. Polit. Govern. 10 (3), 213–225. https://doi.org/10.17645/PAG.V10I3.5326.
Periyannan, E., Ramachandra, T., Geekiyanage, D., 2023. Assessment of costs and benefits of green retrofit technologies: case study of hotel buildings in Sri Lanka. J. Build. Eng. 78. https://doi.org/10.1016/j.jobe.2023.107631.

Petrescu, A.G., Bîlcan, F.R., Petrescu, M., Oncioiu, I.H., Türkes, M.C., Căpuşneanu, S., 2020. Assessing the benefits of the sustainability reporting practices in the top Romanian companies. Sustainability 12 (8). https://doi.org/10.3390/SU12083470.

Pombo, O., Allacker, K., Rivela, B., Neila, J., 2016. Sustainability assessment of energy saving measures: a multi-criteria approach for residential buildings retrofitting - a case study of the Spanish housing stock. Energy Build. 116, 384–394. https://doi.org/10.1016/j.enbuild.2016.01.019.

Ponomarenko, T., Nevskaya, M., Jonek-Kowalska, I., 2021. Mineral resource depletion assessment: alternatives, problems, results. Sustainability 13 (2), 1–15. https://doi.org/10.3390/su13020862.

Pope, J., Bond, A., Hugé, J., Morrison-Saunders, A., 2017. Reconceptualising sustainability assessment. Environ. Impact Assess. Rev. 62, 205–215. https://doi.org/10.1016/j.eiar.2016.11.002.

Pranugrahaning, A., Donovan, J.D., Topple, C., Masli, E.K., 2020. Corporate sustainability assessments in the information communication technology sector in Malaysia. Sustainability 12 (21), 1–23. https://doi.org/10.3390/su12219271.

Pranugrahaning, A., Donovan, J.D., Topple, C., Masli, E.K., 2021. Corporate sustainability assessments: a systematic literature review and conceptual framework. J. Clean. Prod. 295. https://doi.org/10.1016/j.jclepro.2021.126385. Elsevier Ltd.

Prasetya, H.D., Saraswati, E., Ghofar, A., 2017. Corporate social responsibility disclosure and corporate financial performance: a meta-analysis. Russ. J. Agric. Soc. Econ. Sci. 68 (8), 3–11. https://doi.org/10.18551/rjoas.2017-08.01.

Proikaki, M., Nikolaou, I., Jones, N., Malesios, C., Dimitrakopoulos, P.G., Evangelinos, K., 2018. Community perceptions of local enterprises in environmentally degraded areas. Journal of Behavioral and Experimental Economics 73, 116–124. https://doi.org/10.1016/j.socec.2018.01.007.

Ranängen, H., Cöster, M., Isaksson, R., Garvare, R., 2018. From global goals and planetary boundaries to public governance-A framework for prioritizing organizational sustainability activities. Sustainability 10 (8). https://doi.org/10.3390/su10082741.

Ranga, M., Etzkowitz, H., 2013. Triple helix systems: an analytical framework for innovation policy and practice in the knowledge society. Ind. High. Educ. 27 (4), 237–262. https://doi.org/10.5367/ihe.2013.0165.

Rifkin, S., Raman, R., 2021. The business case for sustainable apparel at EILEEN Fisher. https://www.edf.org/sites/default/files/expertconsensusreport.pdf.

Ruparathna, R., Hewage, K., Sadiq, R., 2017. Economic evaluation of building energy retrofits: a fuzzy based approach. Energy Build. 139, 395–406. https://doi.org/10.1016/j.enbuild.2017.01.031.

Sala, S., Ciuffo, B., Nijkamp, P., 2015. A systemic framework for sustainability assessment. Ecol. Econ. 119, 314–325. https://doi.org/10.1016/j.ecolecon.2015.09.015.

Santos Coelho, R., Coelho, P.S., Antunes, P., Ramos, T.B., 2019. Stakeholders perspectives on the use of indicators in water resources planning and related strategic environmental assessment. J. Environ. Assess. Pol. Manag. 21 (1). https://doi.org/10.1142/S1464333219500017.

Securities Commission Malaysia, 2024. Consultation paper on the proposed national sustainability reporting framework. https://www.sc.com.my/nsrf.

Shao, Y., Chen, Z., Xiao, H., Zhu, Z., Li, B., 2019. Integrating environmental parameters and economic benefits to analyze the ecological agriculture (EA) application in the mountain rice paddy system of Chongqing, China. Environ. Sci. Eur. 31 (1). https://doi.org/10.1186/s12302-019-0204-2.

Sharvini, S.R., Noor, Z.Z., Stringer, L.C., Afionis, S., Chong, C.S., 2022. Energy generation from palm oil mill effluent: a life cycle cost-benefit analysis and policy insights. Renew. Sustain. Energy Rev. 156. https://doi.org/10.1016/j.rser.2021.111990.

Silva, S.E., Luzia, E., De Castro, B., Reis, L.P., 2022. The technology transfer university capability: a case study from the triple helix perspective. 17th European Conference on Innovation and Entrepreneurship 491–498.

Sotos, M., 2015. GHG protocol corporate standard GHG protocol scope 2 guidance. https://ghgprotocol.org/.

Susi Wardhani, R., Agustina, D., Indarwati, K., Qomaruddin Ridwan, M., Hasanuh, N., 2022. The influence of sustainable reporting and corporate governance on value of mining companies listed on the ASEAN stock exchange. Asia-Pacific Management Accounting Journal 17.

Testa, M., D'Amato, A., 2017. Corporate environmental responsibility and financial performance: does bidirectional causality work? Empirical evidence from the manufacturing industry. Soc. Responsib. J. 13 (2), 221–234. https://doi.org/10.1108/SRJ-02-2016-0031.

The Business Case for Implementing Sustainable Practices to Drive Financial Performance within the Automotive Sector, 39 (2), 2021, 1–25. https://www.stjohns.edu/sites/default/files/uploads/Review-of-Business-June-2019.pdf.

Tracy, U.A., Holt, V., Douglas, E., Whelan, T., 2019a. The return on sustainability investment (ROSI): monetizing financial benefits of sustainability actions in companies. Rev. Bus.: Interdisciplinary Journal on Risk and Society 39 (Issue 2).

Tracy, U.A., Holt, V., Douglas, E., Whelan, T., 2019b. The return on sustainability investment (ROSI): monetizing financial benefits of sustainability actions in companies. Rev. Bus.: Interdisciplinary Journal on Risk and Society 39 (Issue 2).

Tushar, Q., Zhang, G., Bhuiyan, M.A., Giustozzi, F., Navaratnam, S., Hou, L., 2022. An optimized solution for retrofitting building façades: energy efficiency and cost-benefit analysis from a life cycle perspective. J. Clean. Prod. 376. https://doi.org/10.1016/j.jclepro.2022.134257.

Vanham, D., Leip, A., Galli, A., Kastner, T., Bruckner, M., Uwizeye, A., van Dijk, K., Ercin, E., Dalin, C., Brandão, M., Bastianoni, S., Fang, K., Leach, A., Chapagain, A., Van der Velde, M., Sala, S., Pant, R., Mancini, L., Monforti-Ferrario, F., et al., 2019. Environmental footprint family to address local to planetary sustainability and deliver on the SDGs. Sci. Total Environ. 693. https://doi.org/10.1016/j.scitotenv.2019.133642. Elsevier B.V.

Wang, Y., Dong, L., Li, H., 2022. Economic evaluation of energy-saving retrofit of existing hotels. Energies 15 (3). https://doi.org/10.3390/en15030757.

World Commissions on Development and Environment, 1983. Brundtlant report. https://www.are.admin.ch/are/en/home/media/publications/sustainable-development/brundtland-report.html.

Xiao, H., Li, K., Zhang, D., Tang, Z., Niu, X., Yi, L., Lin, Z., Fu, M., 2022. Environmental, energy, and economic impact assessment of sludge management alternatives based on incineration. J. Environ. Manag. 321. https://doi.org/10.1016/j.jenvman.2022.115848.

Ye, R., Espe, M.B., Linquist, B., Parikh, S.J., Doane, T.A., Horwath, W.R., 2016. A soil carbon proxy to predict CH4 and N2O emissions from rewetted agricultural peatlands. Agric. Ecosyst. Environ. 220, 64–75. https://doi.org/10.1016/j.agee.2016.01.008.

Zhivkova, S., 2022. Sustainability and the reasons for its adoption in the companies. International Conference on Innovations in Science and Education (Economics and Business) 75–80 doi.org/peb.v3.296.

Zhou, C., Etzkowitz, H., 2021. Triple helix twins: a framework for achieving innovation and un sustainable development goals. Sustainability 13 (12). https://doi.org/10.3390/su13126535.

Zhou, Z., Zhou, L., Zhu, C., Ebert, A., 2016. Establishing energy consumption quota for residential buildings using regression analysis and energy simulation. Journal of Engineering Science and Technology Review 9 (Issue 6). www.jestr.org.