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Advancing Climate Transparency and Accountability: TCFD-based climate reporting

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Abstract
Climate reporting has emerged as a crucial mechanism to scrutinise firms' environmental transparency and accountability, owing to the catastrophic impacts of climate change globally. This study aims to develop a Climate-Related Information Disclosure index (CRIDi) that serves as an instrument for a consistent and comparable environmental evaluation for business players in Malaysia. The study's main contribution lies in the integration of the recommendations by the Task Force on Climate-related Financial Disclosures (TCFD) and listing requirements by Bursa Malaysia. It benefits businesses for regulation adherence besides preparing firms to respond timely and appropriately to identified climate risks and opportunities.

Keywords: Climate change reporting; Sustainability reporting; TCFD; Transparency

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1.0 Introduction
The concept of governance by disclosure is discussed in previous literature to promote transparency and accountability (Gupta, 2010; Pattberg, 2017). It rests on the disclosure mechanism's ability to reduce information asymmetry between the organisation's management and stakeholders. Information dissemination enables stakeholders to scrutinise the firm's operation, thus holding them responsible for their actions. The same concept is particularly relevant in promoting sustainable and green business practices, as the firm will be held liable for the environmental impacts caused by the business operation. Pattberg (2017) emphasised the potential of the disclosure approach as a mechanism to support the commitment made under the Paris Agreement to limit the global temperature rise within the 2°C threshold via a generic form of environmental disclosure.

Following the national commitment to net-zero emissions, the urge for market players to move towards the same path is intensified. Previous literature extensively investigated sustainability reporting in discussing firms' environmental management. However, climate-related information reporting made its way into the corporate reporting landscape owing to the catastrophic impact of climate change globally. Some countries, such as Australia and the United States, have even mandated reporting of carbon or greenhouse gas emissions as one of the efforts heading toward the aspiration of net-zero carbon (Myers, 2019). Reference was made to the reporting frameworks and guidelines available in the market, such as the Task Force on Climate-Related Financial Disclosures (TCFD), Carbon Disclosure Project (CDP), Sustainability Accounting Standard Board (SASB) Standards or the Global Reporting Initiatives (GRI), as a

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foundation for the establishment of the relevant legislation. With that, firms' transparency and accountability are boosted, and comparability is also enabled.

In Malaysia, the establishment of the Climate Change Act is still being drafted by the Ministry of Natural Resources, Environment and Climate Change, and the delay is due to the change of government (Basyir, 2023; Majid, 2021). Hock and Zainudin (2024) stated that other obstacles to formulating climate change policy include economic conditions and governance. However, with the active role played by Bursa Malaysia, the disclosure of sustainability information by listed issuers has evolved with the inclusion of climate-related information in a dedicated section within the Sustainability Statement in alignment with the TCFD recommendations. It is incorporated in the recent amendment dated September 26, 2022, on Practice Note 9 of the Enhance Sustainability Statement. This crucial move is significant as despite reporting a progressive trend in the disclosure of climate-related information among listed firms in Malaysia, Darus et al. (2020) found that listed firms in Malaysia have yet to use a proper framework to assess climate change's impact on business. The study aims to develop a comprehensive instrument to measure the pursuit of climate change reporting in alignment with the TCFD requirements, called the Climate-Related Information Disclosure Index (CRIDI). The goal is to combine the information embedded in the TCFD recommendations and other sustainability matters concerning climate-related information as prescribed by the regulatory body in Malaysia. The development of CRIDi has gone through procedures to ensure its validity and reliability, focusing on the emerging market of Malaysia. Therefore, it offers a valuable instrument to evaluate and quantify Malaysia's market players' preparedness for the listing requirements heading towards a full implementation for the financial year ending December 31, 2025.

2.0 Literature Review

2.1 Reporting frameworks and standards for climate disclosure in Malaysia

Gulluscio et al. (2020) reported a few terms used by previous literature in studying climate-related information disclosure, such as climate accounting, carbon accounting and climate change reporting. Even though each might have a slight difference in terms of their context and audience, all are meant for the same purpose: to counteract climate change by disclosure of climate-related information. Generally, previous studies referred to the global climate reporting frameworks or standards, such as TCFD, CDP, SASB, or GRI, in developing a disclosure index. Goswami et al. (2023) conducted a comparative analysis of the reporting frameworks and standards available in the market. They found that firms adopted multiple frameworks to address various stakeholders. It may apply to cross-listing or multinational companies since, besides the local regulations, firms are bound to foreign laws and regulations. However, for certain firms, the diversity of frameworks and standards may lead to confusion about which to adopt. Nevertheless, the situation is enlightened in Malaysia as the stock exchange regulator specified the TCFD recommendations for climate-related information disclosure in 2022 (BM, 2022).

In Malaysia, two amendments are made by Bursa Malaysia concerning sustainability reporting. The first amendment of the Sustainability Amendment occurred on October 8, 2015, and the second was on September 26, 2022, called Enhanced Sustainability Reporting Framework. Prior to the first amendment by Bursa Malaysia, Ahmad and Hossain (2015) found that climate change and global warming disclosures among Malaysian firms are still at the introductory stage. The study reported that the number of firms addressing climate change and global warming is only 5%. The awareness of climate reporting among Malaysian firms increased from 2015 to 2019 despite their overall low level of disclosure, as reported by Abdalla et al. (2024). However, Ioannou and Serafeim (2017) found that Malaysian firms tend to adopt GRI guidelines when reporting their sustainability information. It is understandable as compared to the TCFD recommendations that were only released in 2017, the GRI guidelines were launched in 1997 (Gulluscio et al., 2020). The GRI guidelines were also introduced in the first amendment but were then deleted and replaced with the TCFD recommendations during the second amendment by Bursa Malaysia in 2022 (BM, 2015, 2022). Consequently, Malaysian listed firms could be more accustomed to the earlier reporting framework introduced by Bursa Malaysia, necessitating more adjustment time.

The departure from one reporting framework to another may impact firms financially and non-financially. However, a dialogue between the major standard setters, Corporate Reporting Dialogue (CRD), found a high level of alignment between the TCFD recommendations with other frameworks such as GRI, SASB and CDP (CRD, 2019). It shows that firms may need a slight adjustment to adhere to the requirements instead of starting from scratch if they already complied with the earlier reporting framework. Additionally, a study by Achenbach (2021) conducted interviews with TCFD supporters and garnered constructive comments from firms adopting the TCFD recommendations. The firms mentioned that stakeholders managed to comprehend the climate-related information disclosed besides recognising that the information disclosed goes beyond the retrospective application, as it contains a critical strategic dimension (Achenbach, 2021). It is justifiable as, in alignment with the TCFD requirements, firms are compelled to set forth climate actions and strategic approaches to contend with hypothetical scenarios of a 1.5°C and 2°C increase in global temperatures, strengthening their readiness for timely and resilient green strategies.

2.2 Task Force on Climate-Related Financial Disclosures (TCFD)

The Financial Stability Board (FSB) established the Task Force on Climate-Related Financial Disclosures (TCFD) in 2015 to ascertain the climate risk information essential for investors, lenders, and insurance companies. They came out with the final recommendation in June 2017 after inviting public feedback in December 2016. Since then, it has become the foundation for national and international climate-related disclosure requirements. Throughout the years, the task force has issued a few additional guidelines for climate information disclosures and status reports for the state of market players' adoption. The TCFD's supporters have been reported to be increasing occasionally, with the latest update of over 4,000 supporters in November 2022. Despite being newly developed, the adoption of TCFD by market players was expedited with support from the G7 and G20 countries as the countries were harmonising their domestic regulatory framework with the TCFD recommendations.

In addition, the International Financial Reporting Standards (IFRS) Foundation has also employed TCFD recommendations as the foundation for developing its sustainability reporting standard called IFRS Sustainability Standard in November 2021. The IFRS Foundation has established the financial reporting standards called IFRS Accounting Standard, which has been adopted worldwide, including in Malaysia. The convergence of accounting standards in Malaysia with the IFRS suggests that the IFRS Sustainability Standards are likely to be mandated for firms in Malaysia in the future. It is supported by the highlight made by the Security Commission of Malaysia that the plan to adopt the IFRS Sustainability Standard in Malaysia is to instil sustainability principles into the Malaysian firm's strategic planning (Razak, 2023). Hence, the early adoption of TCFD recommendations will advantageously position Malaysian firms as they preemptively align with the forthcoming sustainability standards recognised by the relevant regulators.

3.0 Methodology

In developing the index called Climate-Related Information Disclosure index (CRIDi), several steps were involved, consistent with Ramba et al. (2018) and Joseph et al. (2022). The details of the steps taken are discussed as follows.

3.1 Step 1: Identification of item of disclosure

Firstly, basic climate-related information is determined based on the TCFD recommendations. Besides the four pillars of governance, strategy, risk as well as metrics and targets, the current study has also considered the context and suggestions of information to be provided for each element covered by the TCFD for non-financial groups. Secondly, the listing requirements by Bursa Malaysia were considered, specifically Practice Note 9 concerning the Enhanced Sustainability Reporting Framework. The Enhanced Sustainability Reporting Framework is the amendment made by Bursa Malaysian on September 26, 2022, in response to the significant development of global climate change, which included therein the requirement to disclose sustainability matters and the conformance of TCFD-aligned disclosures. The requirement was implemented on a phased approach with full adherence to TCFD-aligned disclosure commencing with the annual report for the financial year ending December 31, 2025. Therefore, few sustainability matters as per the listing requirements have been included under the pillars of governance as well as metrics and targets to provide a comprehensive index of climate disclosure to suit the Malaysian market, catering to all industry sectors except for the financial sector.

3.2 Step 2: Reference to previous studies for scoring rules

Thereafter, reference was made to the previous literature in the environmental and climate studies realm to determine the scoring rules for each item covered in the draft CRIDi (Braasch & Velte, 2023; Darus et al., 2020). In deciding the disclosure measurement, a study by Joseph and Taplin (2011) provides empirical evidence concerning the use of disclosure occurrence over disclosure abundance in the study of sustainability reporting in Malaysia. Despite reporting a more significant result over the disclosure occurrence based on the higher R-squared and statistically significant independent variables, the author mentions the legitimacy of both approaches to measure the extent of disclosure. However, the current study's preference over disclosure occurrence is supported by the requirement of the listing requirements on the quantitative information to be disclosed by the listed issuers for the sustainability matters in the amendments made on September 26, 2022. Therefore, the current study has adopted scoring rules and rationale as applied by Braasch and Velte (2023), which is consistent with Wiseman (1982). The score ranges from zero (0) to three (3), where generally zero (0) is awarded for no disclosure, one (1) is for non-specific qualitative disclosure, two (2) is for specific qualitative information, and three (3) is for quantitative disclosure. These scoring rationales were specified further in assessing the information disclosed by listed issuers, which aims to cater to publicly listed firms in Bursa Malaysia. With that, the draft CRIDi has thirteen disclosure items under four pillars and is subject to a pilot test.

3.3 Step 3: Pilot test

Upon completing the draft of CRIDi, a pilot test was conducted on eleven companies to investigate the suitability of the scoring rationales and rules adopted for the Malaysian market (Haniffa & Cooke, 2005). For the pilot test, one company from each industry, as per Bursa Malaysia's sectorial indexes except for financial services and real estate investment trusts, were chosen to ensure the index's scoring rationale and rules managed to cater for all industries. Besides ensuring all industries were covered, the types of sustainability reporting were also considered to ensure consistent rules could be applied for the final sample. Hence, it consists of two integrated reports, four annual reports and five sustainability reports. The current study has applied a few rules to analyse the firms' climate reporting, which is consistent with a study by Braasch and Velte (2023). The current study focuses on the sustainability statement section of the annual report and the information related to the climate aspects explicitly stated in the report. Two scholars were involved at this stage to finalise the scoring rationales and rules for each item of climate disclosure to ensure reliability (Joseph et al., 2022).

3.4 Step 4: Resolving discrepancies

The difference in awarded scores between the two coders during the pilot study was discussed for improvisation and consistency, especially on the scoring rationale. From the pilot study, the most discussed pillars were strategy and risk management. In resolving the discrepancies, the TCFD guidelines were mainly referred to, together with the previous literature. Therefore, for the strategy pillar, the current study follows the specific information prescribed by the TCFD. They have identified the types of risks that firms should disclose moving towards net-zero carbon emission: transition and physical risks and the climate scenario. The study referred to further explanation of these three notions of climate strategies by the TCFD. Whereby for risk management, considering the Malaysian landscape, the information related to the United Nations Sustainable Development Goals (UNSDGs) and material matrix to determine the risks' materiality and significance has been decided to be stated as part of the scoring rationale since the Climate Change Act is not yet in place. Concerning the UNSDGs, a strong association has been reported by Gulluscio et al. (2020) on SDG 13 of Climate Action with the reduction of greenhouse gas emissions. Moreover, a study by Bahari et al. (2023) revealed that following the launch of SDG in 2015, the reporting of climate-related information among Malaysian listed firms has shown a consistent upward trajectory year after year.

3.5 Step 5: Validation of CRIDi

After a few adjustments to the CRIDi following the pilot study, the validation of items of climate disclosure was conducted involving two experienced scholars in sustainability studies to review and validate each item of climate disclosure for CRIDi. This step was crucial as the valuable opinions and recommendations from scholars will improve the quality and reliability of CRIDi. The expert opinion has been discussed upon finalising the final version of the CRIDi. A few things have been raised, such as the exclusion of other sustainable matters per listing requirements and the possibility of using a more detailed scoring score. However, as the state of climate reporting in Malaysia has not matured yet and is at an early stage, the current study has maintained the existing score of zero (0) to three (3) to assess the current state of climate reporting in Malaysia more accurately. For the other sustainability matters as per listing requirements, the information on the emission has been amended by adding up a separate item of disclosure for Scope 3 emission under the element of targets and metrics considering its importance to green energy transition.

4.0 Findings and Discussion

Upon incorporating the points raised by the experts, the final version of the CRIDi consists of fourteen items of climate information disclosure structured across four pillars, each with the scoring rationales presented in Figure 1.

The adoption of the TCFD framework reflects a response to the study by Darus et al. (2020), who commented on the proper framework needed by Malaysian firms in reporting their climate-related information. Additionally, incorporating Malaysia's regulatory body's disclosure requirements adds value to the contextual applicability and relevance of CRIDi for Malaysian publicly listed companies (PLCs). The dual-layered approach serves as a practical tool in evaluating regulation adherence and moving synchronously with the global move towards climate transparency and accountability. Thus, the CRIDi is not merely a scoring tool but a diagnostic instrument capable of informing policy refinement, corporate strategy, and stakeholder engagement.

5.0 Conclusion and Recommendations

In conclusion, the development of the CRIDi marks a pivotal contribution to the pursuit of climate transparency and accountability among firms in Malaysia, which is aligned with the goal of the national inspiration of carbon neutrality by 2050. The index covers not only the aspect of carbon or greenhouse gas emission accountability but also corporate governance and management of climate risks, thus projecting the firm's comprehensive strategic planning over climate change. In adapting to the new disclosure requirements, market players are bound to embed climate risks and opportunities into their business operation and oversee its progress via an internal data collection system. This crucial move is significant as, under the latest requirement, it requires the disclosure of quantitative sustainability information for three consecutive years. Besides serving as a mechanism of regulation adherence, these powerful data are useful for analytic analysis in assessing the firm's financial performance.

5.1 Limitation of the Study

The development of CRIDi only incorporates two out of eleven common sustainability information required by Bursa Malaysia, as the index is intended mainly for climate change reporting. Its application may be limited to only PLCs in Malaysia as different disclosure requirements may be imposed in other countries.

5.2 Direction for Further Research

Future research may consider the inclusion of other sustainability matters to be disclosed by the listed issuers, with careful consideration of the implementation date due to phased basis implementation applied by the regulatory body. In addition, with the CRIDi, the pursuit of climate change reporting of PLCs in Malaysia can be carried out.

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Paper Contribution to Related Field of Study

The study attempts to make a beneficial contribution to climate studies by providing a tangible instrument aligned with the TCFD recommendations to assess and evaluate climate-related information disclosure in emerging markets, specifically Malaysia. As the regulators embrace the guidelines for the local market, the effectiveness of related regulations in promoting sustainable and green business practices could be investigated.

Pillars		Scoring rationale for each reporting criterion recommended by TCFD (2017) Bursa Malaysia (2015) and Bursa Malaysia (2022)	Point range
Governance	*1.1*	*TCFD: "Describe the board's oversight of climate-related risks and opportunities."* 1 = Non-specific qualitative disclosure, for example, if the board addresses climate-related issues within the respective reporting year, although it has no clear responsibility for monitoring the company's climate-related risks and opportunities. 2 = Specific qualitative disclosure, for example, information that specifically states the supervisory board's monitoring of climate-related risks and opportunities. 3 = Quantitative disclosure, for example, frequency by which the supervisory board / board committee is informed over climate-related risks and opportunities; number of climate experts on the supervisory board.	0 - 3
	1.2	*TCFD: "Describe the management's role in assessing and managing climate-related risks and opportunities."* 1 = Non-specific qualitative disclosure, for example, if reference is made to non-financial indicators within the relevant text passage and it becomes clear throughout the report that climate-related measures are part of these indicators; if the CEO mentions climate change in his/her letter. 2 = Specific qualitative disclosure, that is, detailed description of management processes or remuneration policy with climate reference. 3 = Quantitative/Monetary disclosure, for example, climate-related remuneration; frequency of climate-related management processes.	0 - 3
	1.3	*Bursa Malaysia: "Governance structure in place to manage the economic, environmental and social risks and opportunities."* 1 = Combined committee in monitoring the climate-related affairs, ie under the purview of risk committee, audit committee or etc, to oversee firm's sustainability affairs. 2 = Separate committee in monitoring the climate-related affairs, ie sustainability commiittee to oversee firm's sustainability affairs.	0 - 2
	1.4	*Bursa Malaysia: "A statement on assurance provided to the Sustainability Statement".* 1 = Internal review by firm's internal auditor. 2 = Independent assurance performed in accordance with recognised assurance standards but no disclosure of opinion issued by the independent assurance. 3 = Independent assurance performed in accordance with recognised assurance standards and disclose the opinion issued by independent assurance.	0 - 3
		Total	***11***
Strategy	*2.1*	*TCFD: "Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term."* 1 = Non-specific qualitative disclosure, for example, climate risks identified but NO time-horizons; statement regarding/plans to implement processes for identifying climate-related risks and opportunities (in line with the TCFD recommendations). 2 = Specific qualitative disclosure, that is, climate risks are described in detail (incl. Time horizons and/or how these risks are identified). 3 = Quantitative disclosure, for example, climate risks and opportunities are described using quantitative information such as the year a certain risk will potentially occur (incl. Transition risks through new reporting regulations).	0 - 3
	2.2	*TCFD: "Describe the impact of climate-related risks and opportunities on the organization's business, strategy, and financial planning."* 1 = Non-specific qualitative disclosure, for example, the impacts of climate-related risks and opportunities are only mentioned. 2 = Specific qualitative disclosure, for example, the impacts of climate-related risks and opportunities are comprehensively described. 3 = Quantitative/Monetary disclosure, for example, monetarization of identified climate-related risks or opportunities.	0 - 3
	2.3	*TCFD: "Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2ºC or lower scenario."* 1 = Non-specific qualitative disclosure, for example, scenario analysis/analyses is/are used. 2 = Specific qualitative disclosure, for example, scenario analysis/analyses is/are used, and the impacts on the business are described. 3 = Quantitative/Monetary disclosure, for example, monetarization of impacts identified through (a) scenario analysis/analyses.	0 - 3
		Total	***9***
Risk	*3.1*	*TCFD: "Describe the organization's processes for identifying and assessing climate-related risks."* 1 = Non-specific qualitative disclosure, for example, risks identified with no reference made to the global standard or relevant regulation. 2 = Specific qualitative disclosure, for example, consideration of current and potential regulations such as United Nation Sustainable Development Goals (UNSDG), GRI and etc. 3 = Quantitative/Monetary disclosure, for example, consideration of limits on emissions, climate change models, data and analytics in relation to climate affairs.	0 - 3
	3.2	*TCFD: "Describe the organization's processes for managing climate-related risks."* 1 = Non-specific qualitative disclosure, for example, materiality assessment is only mentioned for decision-making processes for mitigation, transfer, acceptance, or control of risks. 2 = Specific qualitative disclosure, for example, materiality assessment is specifically described for decision-making processes for mitigation, transfer, acceptance, or control of risks. 3 = Quantitative/Monetary disclosure, for example, prioritization of identified transition and physical climate-related risks incl. How materiality determinations are made within their organization (specifically for TCFD's identified climate risk).	0 - 3
	3.3	*TCFD: "Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management."* 1 = Non-specific qualitative disclosure, for example, information that states that climate-related risks are integrated into risk management. 2 = Specific qualitative disclosure, for example, information that states how climate-related risks are integrated into risk management. 3 = Quantitative/Monetary disclosure, for example, information on weighting of climate-related consideration in overall risk management.	0 - 3
		Total	***9***
Metrics and targets	*4.1*	*TCFD: "Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management processes."* 1 = Non-specific qualitative disclosure, for example, measures for energy consumption or carbon performance are defined, but not yet applied. 2 = Specific qualitative disclosure, for example, qualitative measures regarding the companies' energy consumption or carbon performance; qualitative historical evolution of measures. 3 = Quantitative disclosure, for example, quantitative measures regarding the companies' energy consumption or carbon performance; quantitative historical evolution of measure.	0-3
	4.2	*TCFD: "Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and related risks."* 1 = Non-specific qualitative disclosure, for example, emissions are only mentioned. 2 = Specific (partly) qualitative disclosure, that is, emissions are (qualitatively) specifically described; emissions are quantified but no reference is made to the GHG emission scopes. 3 = Quantitative disclosure, that is, emissions are quantified and classified as Scope 1, Scope 2, or Scope 3 emission.	0-3
	4.3	*TCFD: "Describe the targets used by the organization to manage climate-related risks and opportunities and their performance against targets."* 1 = Non-specific qualitative, that is, non-specific qualitative target with/without performance disclosure. 2 = Specific (partly) qualitative disclosure, that is, quantitative target,ie carbon reduction target , with qualitative performance disclosure; specific qualitative target with quantitative performance disclosure. 3 = (Fully) quantitative disclosure, that is, quantitative goal, ie carbon reduction target, with quantitative performance disclosure.	0-3
	4.4	*Bursa Malaysia : "Scope 3 emissions in tonnes of CO2e (at least for the categories of business travel and employee commuting)."* 1 = Non-specific qualitative disclosure, for example, Scope 3 emissions are only mentioned. 2 = Specific (partly) qualitative disclosure, that is, Scope 3 emissions are (qualitatively) specifically described; Status and progress of Scope 3 emissions are explained but not yet quantified. 3 = Quantitative disclosure, that is, Scope 3 emissions are quantified explaining on the type of emission falls under Scope 3 emission.	0-3
		Total	***12***
		GRAND TOTAL	***41***

Fig 1: Climate-related information disclosure (CRIDi) items of disclosure
(Source: Adapted BM (2015), BM (2022), Braasch and Velte (2023) & TCFD (2017))

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