



Examining Japanese Integrated Reports for Materiality: An Interpretive Content Analysis Approach

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Abstract. This paper investigates the extent and quality of materiality disclosures in integrated reports (IRs) issued by Japanese electric equipment companies using interpretive manual content analysis of 29 reports from 2021. By applying two disclosure indexes, Categorized Materiality Variables (CMVs) and Materiality Disclosure Quality Variables (MDQVs), the study finds that companies prioritize thematic economic and environmental disclosures while neglecting the quality of materiality determination processes. The findings indicate a strong reliance on domestic guidelines reflecting a “single materiality” orientation characterized by limited measurable environmental, social, and governance (ESG) metrics and under-represented social impact considerations. Additionally, the analysis highlights a tendency towards information overload due to the blending of multiple reporting frameworks and insufficient linkage between financial and non-financial data. This early comprehensive exploration of the Japanese IR context evaluates materiality through a dual lens to bridge the gap between disclosure quantity and quality. Ultimately, the study offers practical insights for report preparers, standard setters, and academics aiming to improve materiality assessment in non-financial reporting.

Keywords: corporate social reporting, integrated report, materiality, content analysis, disclosure quality

JEL Classification: M41, M49

1. Introduction

Corporate reporting has evolved significantly from traditional annual reports to comprehensive non-financial frameworks, including sustainability and integrated reports (IR). While these platforms offer accountability regarding environmental and social repercussions (Burrell and Roberts, 2014), they face persistent criticism for “information overload” and potential greenwashing (Cho et al., 2015). To address this paradox, the concept of materiality serves as a critical filter, distinguishing decision-useful information from irrelevant noise (Eccles et al., 2012). However, unlike the quantitative thresholds in financial accounting, non-financial materiality remains ambiguous, often leading to divergent disclosure practices (Lai et al., 2017). This study investigates how Japanese electric equipment companies navigate this ambiguity in their Integrated Reports, specifically examining the gap between the *presence* of material topics (compliance) and the *quality* of their disclosure (strategy).

The concept of materiality originated within a quantitative paradigm by the presupposition of threshold-based judgements with the intentions of financial information to protect the investors (Jebe, 2019). Regrettably, the genre of financial accounting materiality is not apt to handle the diversified environmental, social, and governance (hereinafter, ESG) information requirements of multi-stakeholder groups; for this reason, many standard-setting and guideline-providing organizations are now embarking on redefining materiality in ESG scope (Zadek and Merme, 2003; Zhou, 2017). Moreover, it is interesting to note that the judgment regarding double materiality (encompassing impact on society) is more complex than the thresholds seen in the financial realm; furthermore, lack of clear direction and practical representations combined provide scope for exploitation by the preparers (Guthrie and Parker, 1990; Lai et al., 2017).

IIRC’s¹ conception of Integrated Report (henceforth IR), among the non-financial reporting mechanisms, is guiding stakeholders to take informed decisions through utilizing interlinked financial and non-financial details. IR has generated great interest from academics and practitioners; many companies are allocating resources to develop it (Eccles and Krzus, 2010; Lai et al., 2017; Mio et al., 2020). Yet, the most critical struggle for IR platform is how to define and operationalize materiality (AICPA and IIRC, 2013; Gerwanski et al., *forthcoming*).

Investors infer materiality based on the presence or absence of information in corporate reports, a factor that directly influences their capital allocation decisions. Yet, despite this reliance, evidence suggests that reports rarely provide a clear separation between material and immaterial topics (Deegan and Rankin, 1997; Kitsikopoulos et al., 2018; Whitehead, 2017). Given all these, the IR setting is a natural ground to explore the concept of materiality (Lai et al., 2017).

1 International Integrated Reporting Council.

The present study aims to assess the existence of materiality in Integrated Reporting (IR) documents of the Japanese electrical equipment industry while applying an interpretive manual content analysis method using a predefined set of materiality characteristics. This particular sector was specifically chosen because Japan is an emerging market from an IR adoption perspective, as well as its electric equipment industry, which ranked top with respect to IR reporting for five consecutive years (KPMG, 2021). Rationally, motivation for this paper derives from a triple source: the vulnerability of materiality conceptualization in the non-financial reporting dimension, the inherent difficulties in performing the materiality principle in IR notwithstanding the widespread acceptance of the concept, and stakeholders' increasing dependence on pertinent ESG information. Building on this line of thought, the following research question drives this study: Are Japanese electric equipment companies providing material information in their IRs? In providing an answer to this question, therefore, the paper adds value by gathering materiality variables from various sources (standard setters, guideline providers, regulators, and scholars), using two different kinds of variable sets and, also importantly, by filling a gap in the literature as one of the first non-financial-materiality based research studies on IRs issued by the Japanese electric equipment industry.

The rest of the paper is organized as follows: Section 2 presents a historical overview of previous content-analysis-based CSR studies and materiality, together with the value proposition for this study; Section 3 includes the statement development process, coding scheme and sampling frame, measurement approach and reliability management; in addition, data analysis was conducted to provide related discussions in Section 4; lastly, concluding remarks including the limitations of the present research and the scope of future research are presented in Section 5.

2. Previous Studies and Background

2.1. The Evolution of Content Analysis and Materiality in CSR Research

Methodological approaches to Corporate Social Responsibility (CSR) reporting have evolved from mechanistic counting to interpretive analysis. Early studies typically employed quantitative content analysis, measuring reporting frequency (e.g. word or sentence counts) under the assumption that volume equates to importance (Berelson, 1952; Deegan and Rankin, 1997). However, recent scholarship postulates that content analysis must transcend simple counting to evaluate the depth, specificity, and strategic relevance of disclosures (Beck et al., 2010; Downe-Wambolt, 1992). Consequently, this study adopts an interpretive approach, focusing on themes and patterns to elicit meaning rather than frequency

(Bengtsson, 2016; Krippendorff, 2004), a method essential for understanding the nuance of materiality.

Central to this quality assessment is the concept of materiality, which has evolved significantly across reporting contexts. Traditionally, standard setters in the financial sphere defined materiality based on the needs of prudent investors (AASB, 2019; IASB, 2018). However, the landscape of non-financial reporting has undergone a paradigm shift following the period of this study's data collection. While earlier reporting was fragmented among voluntary frameworks (GRI, SASB, IIRC), the post-2022 era is characterized by consolidation and mandatory standardization. Notably, the International Sustainability Standards Board (ISSB) was formed to issue IFRS S1 (*General Requirements*) and IFRS S2 (*Climate-Related Disclosures*), focusing on "single materiality" information relevant to investors' financial decisions (IFRS Foundation, 2023).

Concurrently, the European Union adopted the Corporate Sustainability Reporting Directive (CSRD) in 2022, mandating a "double materiality" approach requiring firms to report on both financial risks and their impact on society and the environment (European Parliament, 2022; Adams et al., 2023). Recent interoperability guidance between the GRI and ISSB aims to bridge these perspectives. This study, analysing Japanese IRs from 2021, provides a critical baseline assessment of voluntary disclosure practices immediately preceding this global regulatory shift, offering insights into how prepared Japanese firms were for the "financial materiality" focus of the ISSB standards versus the broader stakeholder focus found in earlier frameworks. *Table 1* summarizes the specific materiality formulations developed by the organizations that were dominant during the study period.

As detailed in *Table 1*, the definitions of materiality vary significantly among guidance providers, creating conceptual instability. For instance, the GRI possesses the widest scope, presuming that stakeholder interests are diverse and requiring thorough engagement. In contrast, CDP focuses narrowly on environmental and climate-heavy reporting via structured questionnaires (CDP, 2021), while SASB clings to a government-mandated frame of financial materiality, struggling to integrate broader ESG themes (Jebe, 2019). The IIRC and AccountAbility occupy the middle ground between these extremes.

Despite these distinct definitions from standard setters, empirical studies indicate a persistent gap in practical application. Research by Gerwanski et al. (2019) and Beske et al. (2020) highlights that while firms often produce materiality matrices to satisfy these frameworks, they rarely link the identified material issues to concrete strategic targets or stakeholder engagement processes. This study addresses that gap by applying a dual-lens framework (CMVs and MDQVs) to the Japanese context, measuring not just the presence of disclosure but the quality of the determination process.

Table 1. Theorizing materiality among major standard setters and guideline issuers

Framework/Body	Entity scope	Stakeholder engagement	Material information bases	Information type for materiality assessment	Materiality perspective
GRI (Eccles and Krzus, 2014; GRI, 2020)	Corporations, nonprofits, municipalities, educational institutions, and governments	All relevant stakeholders	Yes	Key ESG concerns	Primarily qualitative (and possibly quantitative)
IIRC (Eccles and Krzus, 2014; IIRC, 2021)	Corporations	Mainly financial capital providers, followed by other stakeholders	Yes	Organization's ability to create value	Both qualitative and quantitative
SASB (Jebe, 2019; SASB, 2020a)	Corporations	Primary focus on investors	No	Comprehensive information for investors	Both qualitative and quantitative
Accountability (Accountability, 2018; Eccles and Krzus, 2014)	Corporations	Both the organization and its stakeholders	Yes	Sustainability themes based on multi-stakeholder engagement	Qualitative, quantitative, or monetized
CDP (CDP, 2021; Jebe, 2019)	Corporations, cities, and states	Primarily investors	No	Environmental issues affecting a firm's financial and operational health, as well as strategy execution	Both qualitative and quantitative

Source: authors derived

Note: Abbreviations: GRI: Global Reporting Initiative; SASB: Sustainability Accounting Standards Board; IIRC: International Integrated Reporting Council; CDP: Carbon Disclosure Project; MAP: Materiality Assessment Process; ESG: Environmental, Social and Governance; TCFD: Task Force on Climate-related Financial Disclosures.

2.2. Corporate Social Responsibility Literature Based on Materiality Considerations

Lack of clarity in the definition of materiality (Edgley, 2014) and differences in interpreting materiality (Calabrese et al., 2015) have recently urged several scholars to examine this issue more closely. The growth of the research in the field of CSR materiality and its broad range of applications related to the concept is quite evident. *Table 2* provides an overview of materiality-related CSR studies in the recent period (2017–2021) by research area and domain.

As depicted in *Table 2*, compliance with materiality principles in the non-financial reporting horizon has been the most underexplored area in recent literature, whereas the use of categorized variables based on the cohesive GRI framework has become the primary point of interest. Intriguingly, Gerwanski et al. (2019) examined materiality disclosure quality factors that influence classified materiality variables affecting the CSR liability level over time. However, none of them offers a holistic measure by combining categorized and disclosure quality materiality variable.

This research will be one of the areas that have a relatively low density of research in terms of the discussion of compliance and presence of materiality in a tripartite approach. First, it summarizes materiality variables based on the efforts of various standard setters, guideline providers, regulators, and scholars. Secondly, it is comprehensive in addressing both categorized materiality variables and variables associated with the quality of materiality disclosure. Third, this is the first empirical study on material disclosures by the Japanese electric equipment industry in their IR. The insights derived can be of interest to standard setters, framework developers, and policy makers, as well as report preparers; scholars interested in the CSR quality and materiality literature should also benefit from its findings.

2.3. Theoretical Framework

To examine the relationship between materiality disclosures and decision usefulness, this study adopts a dual-theoretical framework combining Legitimacy Theory and Signalling Theory. These theories explain the motivations behind the quantity (CMVs) and quality (MDQVs) of disclosures.

Legitimacy Theory posits that organizations operate under a “social contract” and must disclose information to prove their actions are desirable and appropriate within societal norms (Suchman, 1995; Deegan, 2002). In the context of this study, the CMVs represent the thematic compliance required to maintain legitimacy. By reporting on standard topics such as governance and environmental capital, Japanese firms attempt to align with global expectations and satisfy diverse stakeholder demands (Stakeholder Theory).

Table 2. *Recent (2017–2021) studies in the CSR materiality horizon*

Domain	Source	Research Area
Meaning of materiality	Lai et al., 2017	Exploring how materiality principles are applied within the context of Integrated Reporting (IR).
Determinants of materiality	Gerwanski et al., 2019	Investigating the factors that influence the quality of materiality disclosures and identifying variables that affect materiality.
	Hsu et al., 2013	Developing a model for materiality analysis to systematically identify key issues in Sustainability Reports (SRs) based on stakeholder demands.
Materiality determination process	Corbone and Maroun, 2020	Studying the differences in how materiality is determined by companies listed on the Johannesburg Stock Exchange, with a focus on market, professional, and stakeholder perspectives.
	Fasan and Mio, 2017	Analysing the variables that affect the methods companies use to disclose materiality determination.
	Ferrero-Ferrero, León, and Muñoz-Torres, 2020	Evaluating the impact of the prioritization of material issues on the consistency of environmental performance reporting.
	Mio et al., 2020	Investigating how the identification process of material issues varies between Integrated Reporting (IR) and Sustainability Reporting (SR).
	Puroila and Mäkelä, 2019	Exploring the socio-political role of materiality assessment in promoting the inclusivity of SRs from a critical viewpoint.
	Steenkamp, 2018	Creating guidelines based on material issues reported in Integrated Reports (IR) from award-winning South African companies.
	Wu et al., 2018	Suggesting various methods for screening materiality, taking into account different frameworks and databases.
Materiality and capital markets	Consolandi et al., 2020	Studying the influence of the financial relevance and intensity of ESG materiality on equity returns using the SASB materiality framework.
	Guiral et al., 2020	Understanding how investors assess material versus immaterial and positive versus negative disclosures in Corporate Social Responsibility (CSR) reports.
	Olsen et al., 2021	Investigating investor reactions to mandatory periodic disclosures and fatal incidents in coal mining companies.

Domain	Source	Research Area
	Schiehl and Kolahegar, 2021	Examine the link between financially material ESG disclosures (Single Materiality) and firm-specific information to determine their impact on stock price informativeness.
Materiality and stakeholders	Beske et al., 2020	Exploring the extent of materiality analysis using legitimacy and stakeholder theories, evaluating methods for stakeholder analysis and the connection between GRI-C4 and materiality disclosures.
	Guix and Font, 2020	Integrating a materiality balanced scorecard into performance management systems, incorporating the AA1000 stakeholder engagement standard to address stakeholder expectations.
	Reimsbach et al., 2020	Examining contrasting views of materiality, based on decision usefulness and dual-process theory, focusing on two stakeholder groups: potential employees and capital market participants.
	Torelli et al., 2020	Investigating the potential relationship between the materiality principle and stakeholder engagement, using stakeholder theory and instrumental stakeholder theory.
Compliance and presence of materiality	Lubinger et al., 2019	Assessing whether the material aspects identified in G4-based Sustainability Reports (SRs) from universities are properly reported or if the materiality principle is superficially applied.
	Machado et al., 2021	Identifying the engagement strategies and major stakeholders in the materiality assessment process and determining how GRI-reporting organizations address six materiality indicators.
	Slacik and Greiling, 2020	Analysing whether electric utility companies' SRs adhere to GRI's materiality principles, using logic and conversation theory.

Source: authors derived

Note: Abbreviations: IR: Integrated Report; SR: Sustainability Report.

However, Legitimacy Theory often explains the presence of disclosure rather than its depth. Therefore, we integrate Signalling Theory, which suggests that in the presence of information asymmetry, high-performing firms must send credible signals to distinguish themselves from poor performers (Spence, 1973; Connelly et al., 2011). The MDQVs, such as specific targets, quantified metrics, and transparent determination processes, serve as these credible signals. While a firm can achieve “symbolic” legitimacy by merely mentioning a topic (CMVs), true decision usefulness is achieved only when the disclosure possesses sufficient quality (MDQVs) to reduce information asymmetry for investors (Double Materiality). This dual-lens framework allows us to analyse whether Japanese IRs are substantive tools for value creation or merely symbolic attempts at impression management.

The literature review establishes that while materiality is a central concept in IR, its practical application remains inconsistent and often symbolic. Existing studies lack a unified method to measure both the *breadth* (topics covered) and *depth* (quality of process) of materiality. The following methodology section outlines a dual-index approach designed to capture these two distinct dimensions.

3. Research methodology

3.1. Quality-Based CSR: Methodological Approaches

By increasing the conciseness and relevance of information, materiality enhances the quality of CSR disclosures (Gerwanski et al., 2019; Zhou, 2017) and subsequently the decision usefulness of such information. Several studies have examined various aspects of non-financial disclosures related to quality, incorporating variables such as governance and ethics, family ownership, energy efficiency, business process integration of CSR, institutional characteristics, product responsibility, environmental liabilities and expenditure, labour practices and human rights, major stakeholder identification and engagement, sustainability policies/strategies, anti-corruption efforts, social impacts, community involvement, occupational health and safety, regulatory compliance, economic and business models, corporate profile and background, risk and opportunities, diversity, key performance indicators (KPIs), environmental impact and management systems, responsible and beneficiary parties, assurance and reliability, reporting principles, report design/frequency/accessibility/conciseness, target and trends, a separate CSR section, readability and clarity, and awards and achievements (Aggarwal and Singh, 2019; Beck et al., 2010; Dumitru, et al., 2017; Habek and Wolniak, 2015;

Hooks and van Staden, 2011; Leitonienė and Sapkauskienė, 2015; Matuszak and Rozanska, 2017; Pistoni et al., 2018; Skouloudis et al., 2010; Tsails et al., 2018; Venturelli et al., 2017), as there are a number of studies performed to comprehend similar quality-focused elements of non-financial disclosures using different indicators/variables. Nevertheless, all these research share the same methodology, i.e. content analysis, descriptive statistics, and numerical score system/disclosure index/accountability index.

Inspired by the past studies, this paper uses manual content analysis, which utilizes a relevant numerical rating system disclosure index and descriptive statistics (percentage, mean, standard deviation) to construct data for meaningful interpretation analysis. This study is no different, as the results and the interpretation of any qualitative-content-analysis-based study are derived from index scores (Pesci and Costa, 2014). Once again, a scoring system supports identifying the strengths and weaknesses of non-financial reports and increases industry comparability (Skouloudis et al., 2010). More importantly, this system is built on ordinal data; this type of data are often said not to be capable of being analysed with mean and SD. However, a recent innovative work of Harpe (2015), pertaining to the data of rating scales, suggests that measurement data points from individual rating items having 5 categories in length should typically be identified as continuous data. While individual rating items are ordinal, methodological literature in the social sciences strongly supports the use of parametric statistics (mean and standard deviation) when analysing aggregate indices derived from 5-point scales, provided the sample size is sufficient (Norman, 2010; Sullivan and Artino, 2013). Consequently, this study treats the aggregated CMV and MDQV indices as continuous variables to allow for more granular comparative analysis, a practice consistent with prior disclosure index studies (e.g. Harpe, 2015).

3.2. Research Flow

Before proceeding with the methodology, it is appropriate to present a table or figure stating the order of the research process. This kind of visual representation explains the process of obtaining results and will strengthen the methodology of the study by improving its rigour (Erlingsson and Brysiewicz, 2017; Bengtsson, 2016; Liao et al., 2017). The table below shows the flow of the research work of this study by steps.

Table 3. *Research flow of this study*

Step	Method/Basis	Outcome
Identifying CSR materiality variables	Reviewing materiality assessments from standard setters, regulators, and academic literature	Development of two variable groups: (a) categorized materiality indicators, (b) materiality disclosure quality indicators
Designing the coding framework	Referring to previous studies to define score ranges, score markers, and scoring criteria	Creation of a structured disclosure index with illustrative examples
Sample selection	Examining 2021 non-financial reports from 247 listed Japanese electric equipment firms	Final selection of 29 English self-declared integrated reports
Data collection and coding	Conducting manual content analysis and coding using the disclosure index	Generation of numerical score tables for each variable and company (individual and aggregated)
Reliability assessment	Measuring agreement between coders	Calculation of Krippendorff's alpha
Data analysis	Performing descriptive statistical analysis	Reporting of percentages, means, and standard deviations

Source: authors derived

3.3. Variables and Coding Scheme

When using disclosure index, it is reasonable to understand and choose the indicators of past research (Leitoniene and Sapkauskiene, 2015). All variables are aggregated in *Table 4*, which declares all the resources utilized in this study.

Evaluation of the quality of information in corporate social reports according to the categorized variables is a methodology approach that has already been proven to be highly acceptable by the current literature (Beck et al., 2010; Matuszak and Rozanska, 2017; Skouloudis et al., 2010; Tsails et al., 2018; Venturelli et al., 2017). Furthermore, Gerwanski et al. (2019) studied the variables of materiality disclosure quality that moderate both the categorized variables and materiality of the overall CSR disclosures. To meet this purpose, two types of variables, CMVs and MDQVs, are developed based on the larger sample of providers of these categories; the variables included in this sample are standard setters, guideline providers, regulators, and scholars, which is why both types of variables are referred to hereafter. To be more specific, CMVs are designated to particular indicators (e.g. data security, board compensation international, and so forth), which directly contribute to increasing the usefulness of a disclosure, whereas MDQVs (e.g. targets, materiality determination processes, etc.) contribute indirectly and through CMVs influence disclosure usefulness.

Table 4. Sources of all the selected variables

Serial	Materiality focus	Source(s)	Key insights / Core content
1		KPMG, 2020; KPMG, 2021	Common disclosure topics prioritized by Japanese integrated reporting (IR) preparers
2		Gelmini et al., 2015	Interpretation of materiality within IR and stakeholder involvement in materiality assessment
3		Gerwanski et al., 2019	Factors influencing the quality of materiality disclosures and their effects
4		Lai et al., 2019	Understanding of materiality from the perspective of IR report preparers
5		AccountAbility, 2013	Broadened materiality definition incorporating views of multiple stakeholder groups
6	General	Reporting Exchange, 2020	Identification of key ESG-related material issues in collaboration with CDSB and WBCSD
7		RobecoSAM & GRI, 2016	Alignment of materiality expectations between investors and reporting companies
8		AICPA & IIRC, 2013	Definition of materiality specific to integrated reporting and its assessment process
9		EU Commission, 2014; EU Commission, 2019	Introduction of categorized materiality requirements and the concept of double materiality
10		RobecoSAM & GRI, 2015	Industry-based materiality definition reflecting the views of preparers and investors in technology hardware and equipment
11	Sector-specific	GRI, 2013	Stakeholder perceptions of material topics across technology hardware, semiconductors, and 50 additional industries
12		SASB, 2020b	Materiality topics specific to EMS, ODM, hardware, and semiconductor sectors
13		MEITI, 2017	Integrated reporting guidelines incorporating categorized variables based on both corporate and investor viewpoints
14	Japan-specific	MOE, 2018	Framework for identifying corporate material issues and explaining sustainability with an emphasis on low-carbon society

Note: Abbreviations: CDSB: climate disclosure standards board; WBCSD: world business council for sustainable development; EMS: electronic manufacturing services; ODM: original design manufacturing.

Source: authors derived

In *tables 5–6*, we have CMVs and MDQVs respectively. The CMV table includes 17 variables that are distributed into five sections, and all of them are provided with acronyms to ease data analysis. Therefore, the table on MDQVs has 5 variables with their definitions and acronyms. Once again, sources (serial from *Table 4*) for the variables are reported within the parentheses to further strengthen rigour of enquiry; sectorial materiality sources (serials 10, 11, and 12 from *Table 4*) have been given higher preference; in turn, each selected variable had at least a minimum of three mentions.

Table 5. *CMVs and related sources*

Environmental capital	Social capital	Human capital	Governance	Economic capital
GCE (Greenhouse Gas and/or Chemical Emissions) (6, 9, 10, 11, 12, 14)	DS (Data Security) (10, 11, 12)	LPWC (Labour Practices and Working Conditions) (6, 9, 10, 11, 12, 13)	BSD (Board Structure and Diversity) (1, 3, 5, 9, 11, 13, 14)	BMPD (Business Model and Product Design – Innovation) (5, 6, 9, 10, 11, 12, 13, 14)
EM (Energy Management – Consumption/Efficiency) (6, 9, 10, 11, 12, 14)	DISE (Digital Inclusion and Social Enabling) (5, 9, 10, 14)	OHS (Occupational Health and Safety) (6, 9, 10, 11, 12)	BC (Board Compensation) (1, 9, 11, 13, 14)	SCIM (Supply Chain Integrity and Management) (5, 6, 10, 12, 13, 14)
WWM (Water and/or Wastewater Management) (6, 9, 12, 14)		EDI (Employee Diversity and Inclusion) (5, 6, 9, 10, 11, 12)	PCA (Political Contribution and Accountability) (5, 6, 11)	
HEWM (Hazardous Materials and/or Electronic Waste Management) (6, 10, 11, 12, 14)		TD (Training and Development) (6, 10, 13)	ACB (Anti-corruption and Bribery) (5, 6, 9, 11)	
RM (Recycling Management) (6, 11, 14)				

Source: authors derived

Note: GHG – greenhouse gas.

Table 6. *Quality variables for materiality disclosure (MDQVs) and associated sources*

Variable definition	Acronym
The special value-generating process of the organization as it can be seen in cases 1, 4, 7, and 8	VCP
Identification and description of the risk and opportunity system (1, 3, 7, 8, 9, 10, 13, 14)	SRO
Targets and/or progress towards targets or goals (1, 7, 8, 9, 13, 14)	PTT
The materiality determination (judging) process involves stakeholder involvement (1, 2, 3, 4, 7, 8, 13, 14).	MDP
A special section on materiality is assigned to specify the material matters (1, 2, 3, 7).	SMS

Source: authors derived

The use of disclosure index with different types of non-binary scores and score definers is a usual practice in CSR quality studies. A scoring range from 0 to 5 was not uncommon, although some authors restricted the scoring range to simply 0–2. All scoring ranges and score definers that refer to specific sources are included in *Table 7*.

Table 7. *Different scales and standards of score measurement of disclosure indices used in earlier CSR quality analyses*

Source score	0	1	2	3	4	5
Leitoniene and Sapkauskiene, 2015	Absent	Only mentioned	Detailed information			
Venturelli et al., 2017	Absent	Incomplete disclosure	Full disclosure			
Dumitru et al., 2017	Absent	Narrative only	KPI and numerical	Narrative and numerical		
Tsails et al., 2018	Absent	Qualitative information of specific indicator	Quantitative information of specific indicator	Numerical data that could be utilized to assess the progression of a particular corporate performance		
Habek and Wolniak, 2015	Absent	Some (little) mention	Including the most important aspects	Detailed (better than average) information	Best practice with a creative approach	

Source score	0	1	2	3	4	5
Skouloudis et al., 2010	Absent	Generic or brief statement	Detailed coverage	Extensive coverage	Full and systematic, allowing for comparability	
van Staden and Hooks, 2007	Absent	Anecdotal or briefly mentioned	Descriptive with impact on the company or its policies	Quantitative: effects that are conceptually defined by definite monetary amounts or definite physical quantities	Truly extraordinary: benchmarking against best practice	
Beck et al., 2010	Absent	Purely narrative information of category	Purely narrative yet detailed category information	Purely quantitative categorical information	Numerical disclosures aligned with category, including qualitative explanation(s)	Similar qualitative and quantitative categorical disclosures: narrative and comparative yearly coverage
Pistoni et al., 2018	Absent	An insufficient description, reduced to a bare minimum of international relations (IR) guiding principles	An evaluation based on a few quantitative data, with a few guiding principles of IR	A harmonious narrative of the contents, based on a mean portion of IR guiding principles	An in-depth description of the contents with respect to a rather considerable set of IR-guiding principles	A perfect narrative of the contents, drawing close to all the major guiding principles of IR

Source: authors derived

Note: KPI – key performance indicator.

Based on the above research, two index tables (*tables 8–9*) are constructed, both using a scoring range of 0–4 with associated score markers and the definition criteria. Moreover, as an attempt to mitigate subjectivity in the study, illustrative cases have been offered (Beck et al., 2010; Steenkamp and Northcott, 2008).

Table 8. *A measure of disclosure of CMVs*

Score	Marker	Definition	Illustration (Appendix number)
0	Absence	The category is not mentioned.	
1	Minimum	No mentions or anecdotal details are presented.	B
2	General	The narrative information around the category or theme is located in the main body.	B
3	Detailed	Publication concerning the category or theme consists of the numeric facts, objective data, or other aids, along with general categorization.	B
4	Very detailed	External information is connected to KPIs, material concerns, strategy, policy, risk, prospects, targets, measurement processes, and other timelines, along with the content in details.	B

*Source: authors derived***Table 9.** *MDQVs disclosure index*

Score	Marker	Definition	Illustration (appendix number)
0	Absence	No reference of the content(s) of the variable	
1	Minimum	Mention-only or anecdotal	C
2	General	Overall data based on specified content(s), mostly narrative	C
3	Detailed	General knowledge or information, the majority of which is narrative, grounded on specific material(s). Reporting can involve numerical / objective/ other types of helpful materials as well as general ones.	C
4	Very detailed	Data that would allow the logs to be compared with the detailed category, strategy, goals, or policy, categorized materiality factors, and/or identified material difficulties in terms of time and/or affinity	C

Source: authors derived

3.4. Sampling and Data Collection

Japan is one of the developing countries that adopt IR; in 2010, only 23 corporations disclosed using IR tools, and this number has grown to 733 in 2021. Accordingly, the scope of the analysis is limited to the corporations in Japan. Moreover, it is a cohort where the Japanese electric equipment industry stands out with the highest reporting rates over the past five years (91 out of 513 companies operating through 2021), which is why the proposed study focuses on the Japanese electric equipment industry (KPMG, 2021).

According to the Tokyo Stock Exchange (TSE), there were 247 listed electric equipment companies in 2021. From this population, 91 companies published English non-financial reports, but only 29 explicitly declared their document an

“Integrated Report”. Therefore, these 29 self-declared English Integrated Reports serve as the study’s sample frame.

3.4.1. Sample Characteristics and Potential Bias

We acknowledge that limiting the analysis to English-language reports introduces a selection bias towards globally oriented, large-capitalization firms. Indeed, 26 of the 29 sampled firms were listed on the TSE First Section (now Prime Market), representing the upper echelon of Japanese industry in terms of size and resources. However, this skew towards “better disclosure practices” serves to validate the study’s critical findings rather than undermine them. Since these globally oriented firms typically face higher investor scrutiny and possess greater resources, they represent the “best-in-class” scenario for Japanese IR. Consequently, the identification of significant gaps in materiality quality (MDQVs) within this elite sub-sample implies that such weaknesses are likely systemic and potentially more severe among the broader, domestic-focused population.

3.4.2. Robustness Check: Listing Status

Regarding the influence of company size and listing status, the sample exhibits high homogeneity, with nearly 90% (26 out of 29) of firms belonging to the TSE First Section. This dominance of top-tier firms acts as a control for size and resource availability, suggesting that the variations observed in disclosure scores are driven by management strategy and reporting orientation rather than a lack of capacity to report.

3.4.3. Justification of Timeframe (2021)

The decision to limit the analysis to the fiscal year 2021 is methodologically deliberate. The year 2021 represents the culmination of the “voluntary era” in Japanese Integrated Reporting, immediately preceding the significant regulatory shifts caused by the release of the ISSB exposure drafts and the finalizing of the EU CSRD in 2022–2023. Thus, 2021 serves as a definitive baseline to assess the organic maturity of “Integrated Thinking” in Japan before compliance-driven standardization began to alter disclosure behaviours.

3.5. Reliability Management

To ensure methodological rigour and minimize subjectivity, this study utilized a strict three-stage coding protocol involving two independent coders (the authors).

3.5.1. Training and Pilot Testing

Before the main analysis, a pilot test was conducted on 5 randomly selected reports (approx. 17% of the sample). The coders analysed these reports independently using the preliminary codebook.

3.5.2. Calibration and Iteration

Initial discrepancies were analysed to refine the coding rules. For instance, the distinction between a score of “2” (General) and “3” (Detailed) was sharpened by requiring quantitative evidence for the higher score. This iterative process continued until an inter-coder agreement exceeding 0.80 was consistently achieved.

3.5.3. Independent Coding and Reconciliation

The remaining 24 reports were coded independently. To resolve discrepancies, the coders did not use an “average” score; instead, they employed a “negotiated consensus” approach (Campbell et al., 2010), where differences were discussed until an agreement was reached on the final score based on the textual evidence.

3.5.4. Reliability Metrics

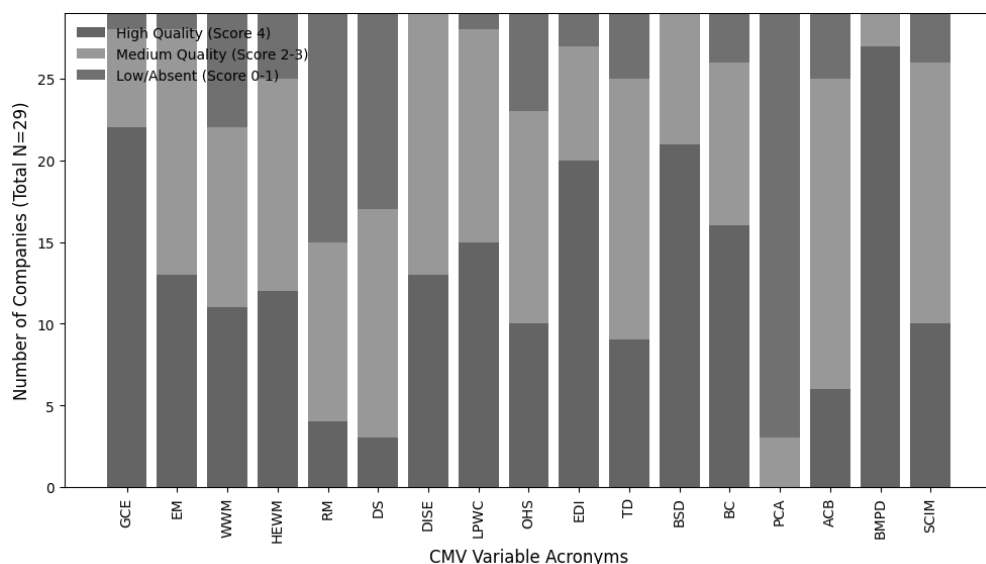
Reliability was measured using Krippendorff’s alpha, which is robust against small sample sizes. The final alpha values for CMVs and MDQVs were 0.946 and 0.891 respectively. In content analysis, an alpha above 0.80 is considered to indicate “high reliability”, while 0.67–0.80 allows for tentative conclusions (Krippendorff, 2004). Our results fall well within the high reliability range, suggesting that the coding scheme is stable and the data quality is sufficient to support the study’s conclusions.

By applying the rigorous coding protocol and statistical reliability checks detailed above, this study ensures that the resulting data is robust. The next section presents the empirical findings derived from this analysis, contrasting the high volume of thematic disclosures against the varying quality of strategic integration.

4. Findings and Discussion

4.1. Categorical Materiality Variable (CMV)

The supply chain and integrity management (SCIM) and the economic-capital-based disclosures that were set using the model of the business and product design (BMPD) scored as the highest at an 87% composite score (see *Figure 1*). Specifically, BMPD scored nearly at the highest level (98 per cent.), which has 27 cases of four, with a low standard deviation of 0.26. This finding also indicates that Japanese electric equipment companies attach great importance to meeting investors' information needs, i.e. financial materiality of sustainability. Similar evidence has been found in recent studies (PWC, Website, 2020; *Reporting Exchange*, 2019). In addition, the scores of environmental and human capitals were rated above the average (70 and 76 percent respectively). These two capitals were reported by firms in a comprehensive manner, varying widely by dimensions; however, three variables were found to be more salient greenhouse gas/chemical emission (GCE), employee diversity and inclusion (EDI), and labour practice and working conditions (LPWC), with scores of 88 per cent (22 incidences of four), 86 per cent (20 incidences of four), and 83 per cent (15 incidences of four) respectively. Modern non-ownership stakeholders are rather vocal about these three variables (GRI, 2013), which suggests that the demand for this kind of information is also recognized by the surveyed companies. In the past, the practice of having environmentally cumbersome disclosures was common among Japanese firms (Kawahara, 2017), which has carried on into modern reports (Ali et al., 2015; Fitriarsi and Kawahara, 2018); yet in both cases the aspects of disclosures surround the aspect of GCE (*Reporting Exchange*, 2019). Others note that the most critical factors behind intensive environmental reporting (Fukukawa and Moon, 2004; Kokobu and Nashioka, 2005) and the related financial benefits (Albrecht and Greenwald, 2014) are associated with BMPD-related issues. The salience of GCE may also be explained by the Act on Promotion of Global Warming Countermeasures (Act No. 117, 1998) (Fitriarsi and Kawahara, 2018). On the other hand, Kawahara and Irie (2015) have discussed a lower than average rate of disclosure with regard to EDI, and findings on the quality of LPWC are inconclusive (Ali et al., 2015; Fukukawa and Moon, 2004; Kawahara, 2017; North and Moriika, 2016).



Notes: The bar chart illustrates the number of companies (Total N = 29) that received different quality scores across various CMVs. The chart shows the distribution of scores in three categories: High Quality (Score 4), Medium Quality (Score 2–3), and Low/Absent (Score 0–1). Each bar represents a different CMV, with the colours indicating the proportion of companies assigned to each score category.

Figure 1. *Distribution of disclosure scores for CMV (see Appendix B for detailed data)*

The average score of the governing body is 61 per cent during the period investigated, and this can be attributed to the fact that the firms under investigation have not yet adopted a modern variable, which would be political contribution and accountability (PCA). This was the variable whose individual score achieved the lowest percentage (7%) with a mean of 0.28 and 26 cases of binary outcomes (1 and 0). The latter results coincide with Ali et al. (2015). The three other variables – under the governance group board structure and diversity (BSD), board compensation (BC), and anti-corruption and bribery (ACB) – achieved average scores of 92%, 79%, and 65% respectively. Interestingly enough, the value of standard deviation among the firms reported by ACB is 1.18, suggesting that the mentioned operations are heterogeneous among companies; in fact, reporting trends indicate a reluctance to disclose negative operational details (Kawahara and Irie, 2015). This confirms the hypothesis that firms are reporting as per governance-group expectations and when analysing the significance of including PCA in the governance group, results indicate that its addition leads to a degradation of the overall disclosure score, diluting the high performance observed in Board Structure (BSD) and Compensation (BC). This trend in performance could be explained by compliance

with the Financial Instruments and Exchange Act and the Corporate Governance Code of Japan Exchange Group (*Reporting Exchange*, 2019).

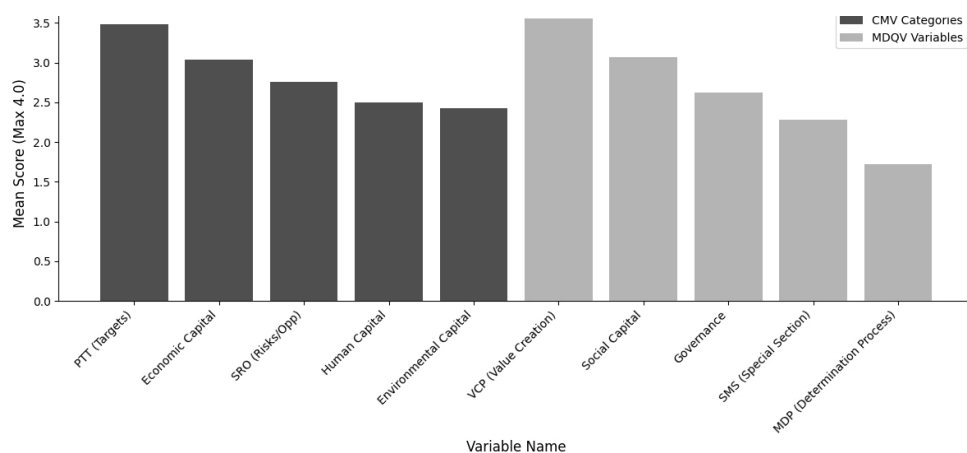
It is generally accepted that reporting on social aspects by Japanese companies is not optimal (Albrecht and Greenwald, 2014; Fitrasari and Kawahara, 2018; Fukukawa, and Moon, 2004; *Reporting Exchange*, 2019). However, the sampled companies indicated data on social capital in a mild tone with a mean score of 63% per cent. To a significant part, this performance was necessitated by the dimensions of digital inclusion and social enabling (DISE), which contributed 80% to the score; noteworthy disclosures under DISE contested minor social initiatives, philanthropies, and welfare provisions. Conversely, disclosures regarding community empowerment strategies were notably underdeveloped, reflecting the limitations of the Japanese CSR model discussed by Fukukawa and Moon (2004), particularly concerning efforts to bridge the digital divide for underserved populations. Besides, in the framework of the Internet of Things (IoT) and 5G technologies, the significance of digital security (DS) has increased (Sicari et al., 2020). Unluckily, DS scored low (45 per cent) and was characterized by 12 cases of binary relationships of 1 and 0 responses.

As examined in the present analysis, the four sections featured a number of contrasting variables. The management of recycling (RM) as a subsidiary of environmental capital displayed a notably low score of 42 per cent (14 instances of 1 and 0) with a high standard deviation of 1.37. These numbers suggest that among the few companies that have attached significance to this variable are the ones whose display of quality has a fair amount of heterogeneity. The overall stakeholder-engagement system (Canon, 2019) combined with Canon has emphasized the significance of information obtained through recycling; unfortunately, the enterprises involved did not meet the requirements of this stakeholder. In addition, the standard deviation of water and wastewater management (WWM) and occupational health and safety (OHS) is also differentiated, and it is 1.55 and 1.40 respectively. Though the average scores associated with the two variables are almost equal, i.e. about 65 per cent, the observed variability indicates different meanings of materiality. This heterogeneity is supported in the literature, as it has been found that OHS disclosures are rated both highly (Ali et al., 2015) and poorly (Nagai, 2014), thus confirming the diversity found in this study.

4.2. The Materiality Disclosure Quality Variable

The total number of MDQVs are significantly less than the CMVs (see *Figure 2*). PTT (targets and progress to targets) achieved 89% with 21 4s. It is interesting to note that the majority of good-quality PTT disclosures were on business figures such as sales/revenue, market share, market growth, ROE, and so forth; quite few disclosures based on non-financial figures could be found. A similar pattern emerged concerning SRO

(identification and description of the system of risk and opportunities), which received 77 per cent and was mainly associated with disclosures connected with financial indicators. These observations also suggest that the Japanese electric equipment companies give high priority to single materiality (investor-centric financial risks). This aligns with the ISSB's approach but neglects the double materiality perspective required by frameworks like the GRI and EU CSRD. This orientation is supported by a recent study by PWC (2020), who suggest that disclosures ought to be aligned with material and quantifiable sustainability goals and environmental ESG risk evaluations. Apparently, the majority of the firms did not provide a comprehensive view of their value-creating process (VCP). Five of the 29 companies had a VCP that recognized capital input–output connections, transformation processes, and impacts on stakeholders' terms, which the mean of 2.62 further confirms.



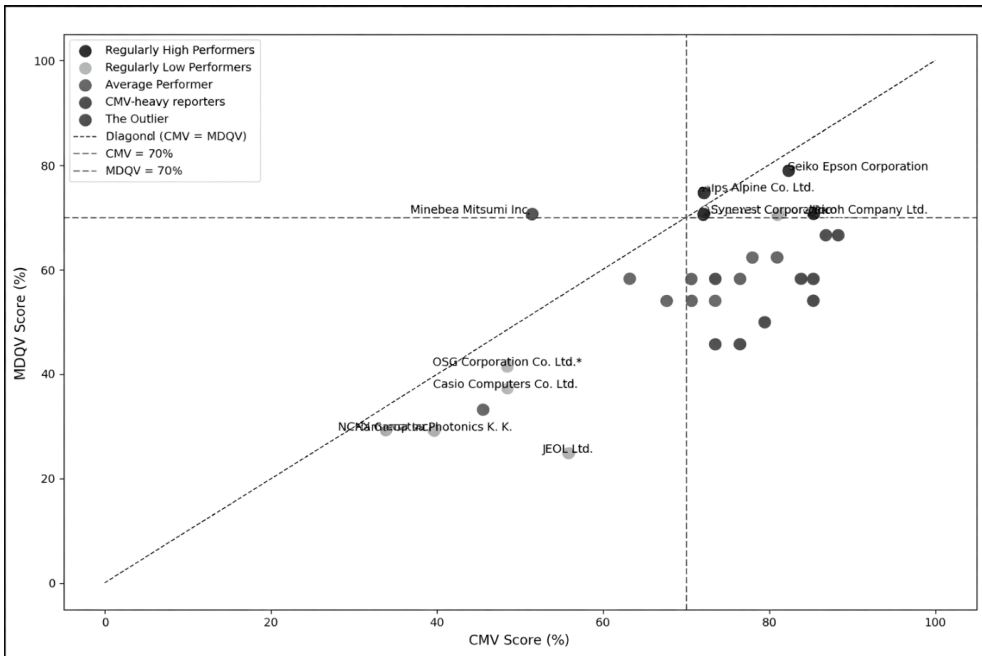
Notes: This bar chart compares the mean scores of different CMVs and MDQVs. The variables are sorted in descending order of their mean scores, with CMVs categories represented in dark grey and MDQVs variables in light grey. The chart illustrates the differences in how companies scored across the two variable types, with the highest scoring variable on the left and the lowest on the right.

Figure 2. Comparison of mean scores: CMVs categories vs MDQVs (see Appendix C for detailed data)

The Materiality Determination Process (MDP) and the presence of a Separate Materiality Section (SMS) serve as the primary mechanisms to specify the material issues addressed in the Integrated Reports. These variables, on the other hand, enjoy limited attention, as they possess low average scores of 1.72 and 2.28 respectively; even more so, high standard deviations of 1.36 and 1.60, respectively, suggest inconsistency in the implementation of the MDP and SMS among firms. There were five companies in which step-by-step MDP disclosures were identified, what is highly encouraged by the standard-setting bodies (Accountability, 2018; GRI,

2020; IIRC, 2021). Besides, material issues were associated with various concepts such as the Sustainable Development Goals, materiality matrices, targets, value creation processes, risk and opportunity assessments, strategic objectives, and potential consequences, among others; for not more than ten companies they were scored at the maximum level with references to the interconnectivity among these concepts within a transparent SMS. Similarly, KPMG (2020) found that 36 per cent of Japanese companies made an MDP, with the overall statement of material issues assessment being rated as below average (Albrecht and Greenwald, 2014) and with approximately a third of Japanese companies having the capacity to facilitate matching the identified material problems with relevant business or sustainability problems (KPMG, 2020; *Reporting Exchange*, 2019).

4.3. Comparison: CMVs versus MDQVs



Notes: This scatter plot visualizes the relationship between CMVs (Content) and MDQVs (Quality) compliance rates for 34 companies. Companies are categorized as “Regularly High Performers”, “Regularly Low Performers”, “Average Performer”, “CMV-heavy reporters”, and “The Outlier”, with distinct colour coding for each category. The dashed lines represent key benchmarks: the diagonal line (CMVs = MDQVs) shows where CMVs and MDQVs scores are equal, and the 70% threshold lines indicate the cut-off for “High Performers”. The plot highlights the performance clusters and the deviation of the outlier company (Minebea Mitsumi Inc.).

Figure 3. Matrix of company performance: CMV vs MDQV compliance rates (see Appendix D for detailed data)

As can be observed in *Figure 3*, the CMVs of Japanese electrical equipment companies are more accurately disclosed than those of MDQVs. The total difference in the scores between CMVs and MDQVs is 15 per cent (70 per cent versus 55 per cent). The two firms had a higher score in the MDQVs set, but one outlier was Minebea Mitsuki Inc., which had a 19 per cent point increase in the MDQVs score. Five companies achieved the highest performance tier for both CMVs and MDQVs. Among them, Seiko Epson Corporation serves as the exemplar for best practices within the sample. In contrast, the six companies classified as low performers provided marginal coverage, with composite scores averaging between 30% and 45%. Furthermore, nine companies were designated as “Average Performers”, having achieved composite scores within the 60%–70% range.

Curiously enough, in the group with the strongest tendency to skew the CMVs disclosure, eight have a difference over 20% in favour of CMVs, which provides a valid picture of the scenario; such level and total average difference signify that MDQVs remains largely unaddressed, as well as that the severity of indirect repercussions in this set of disclosure-entity materiality still has to be realized by sampled corporates.

4.4. Discussion: Global Context and Implications

4.4.1. Global Comparisons and Jurisdictional Contrasts

While Japanese firms demonstrate high compliance with thematic materiality (CMV), their approach differs significantly from other mature IR jurisdictions. Unlike South Africa, where the King IV Code mandates an “apply and explain” approach fostering deep connectivity between financial and non-financial capitals, Japanese disclosures appear heavily influenced by local administrative guidance (METI, MOE). Our findings reveal that Japanese IRs tend to be “comprehensive” (listing all possible topics) rather than “concise” (focusing on value creation). This contrasts with the European Union’s emerging practice under the Corporate Sustainability Reporting Directive (CSRD), which enforces a strict double materiality assessment to filter out non-essential topics. Consequently, Japanese reports risk becoming “composite” documents – merely connecting sustainability data with financial reports – rather than achieving the “integrated thinking” observed in leading South African or European examples.

4.4.2. Alignment with International Literature

These findings resonate with the global discourse on the “materiality gap”. Consistent with Beske et al. (2020), we observe that firms often use materiality

analysis as a symbolic legitimacy tool rather than a strategic filter. Furthermore, our data supports Mio et al. (2020), who argued that without rigorous determination processes (MDQVs), Integrated Reports fail to distinguish themselves from standard Sustainability Reports. However, our study diverges from Eccles et al. (2023) regarding the speed of adoption; while they suggest a rapid global convergence towards ISSB standards, our 2021 baseline data suggests that Japanese firms were structurally entrenched in a “multi-framework” mindset, prioritizing broad stakeholder coverage over the investor-focused precision required by the new IFRS S1/S2 standards.

4.4.3. *The Paradox of Information Overload*

A critical implication of this study is the distinction between “compliance-based disclosure” and “substantive integration”. The high CMV scores coupled with low MDQVs scores indicate that firms are “ticking boxes” for multiple frameworks (GRI, ISO, SDGs) simultaneously. This “multi-framework mixing” leads to information overload, where the sheer volume of unprioritized data obscures the company’s true value creation story. As noted in the results, without the “filtering” function of a high-quality Materiality Determination Process (MDP), the resulting report provides *data* without *decision usefulness*, satisfying neither the broad stakeholder group (due to lack of specific social impact goals) nor the financial investor (due to lack of quantified connectivity).

4.5. Qualitative Evidence and Textual Analysis

To substantiate the statistical trends, a qualitative review of the narratives reveals a distinct gap between symbolic mention and substantive strategy. For instance, regarding Stakeholder Engagement (MDQVs), low-scoring reports typically utilized generic, one-way communication statements such as:

“We value the opinions of our stakeholders and strive to reflect them in our business activities” (Score 2 – General). In contrast, the few high-scoring reports provided specific evidence of dialogue, as seen in this excerpt: “We held 14 dialogue sessions with ESG investors... identifying ‘Human Capital’ as a priority. Consequently, the Board revised the KPI for female management to 15% by 2025” (Score 4 – Detailed). Similarly, for Environmental Capital (CMVs), the reliance on financial materiality was evident. While GHG emissions (GCE) were often supported by precise data, “Scope 1 and 2 emissions down 14%”, social indicators like Data Security (DS) were frequently relegated to vague assurances: “We are strengthening our information security management system”, without referencing specific breaches, training hours, or cyber risk quantification. This textual disparity confirms the quantitative finding that Japanese firms prioritize measurable financial/environmental metrics over qualitative social governance processes.

5. Conclusions

Japanese electric equipment companies publish most material items through CMVs, but with disappointing coverage relative to most MDQVs. In the CMVs set, the companies actually were to make further disclosures related to social capital, namely planning on how to enable disfavoured populations with the help of digitalization while preserving confidential information; furthermore, the aspects of recycling management and political contribution and accountability are to be substantially enhanced. Regarding the MDQVs set, the components of the tone setter, i.e. the process of determining the materiality and the materiality section, should be provided with additional details.

Such companies follow a single materiality route and assign multiple frameworks to one unitary report, particularly expressing a desire of local guidance. The international frameworks are merely acknowledged in their IRs as far as they are exposed to the overseas investment situations – very few IRs abide by their standards. An additional downside is that the lack of connectivity between the financial and ESG components renders these IRs more akin to a “composite” report rather than a truly “integrated” one, exacerbating the issue of information overload. This fragmentation, combined with the adherence to multiple diverse frameworks, diminishes the clarity and comparability of disclosures, thereby undermining the core principle of materiality in IR.

Using only one analytical framework, the analysis should start by conducting an extensive, stepwise, rigorous process of materiality determination followed by a materiality section. This structure takes into consideration the effect of MDQVs on CMVs and is an intentional but minor change in the sustainability structure trend, where subjecting it to a broader group of stakeholders – rather than to a narrow perspective of a primarily financial materiality – would increase not only the scope of coverage but also the linking among disclosures and the materiality of IR disclosure among firms in the Japanese electric equipment industry. Lastly, it will make the IRs more valuable to stakeholders by entrenching quantifiable non-financial objectives that are directly and proportionally connected to the identified material items accompanied by quantifiable environmental accounting statistics that pertain to the variables in question.

5.1. Practical Implications and Recommendations

5.1.1. *Implications for Regulators and Standard Setters*

For regulating bodies such as the Ministry of Economy, Trade, and Industry (METI) and the Financial Services Agency (FSA), the findings suggest that current guidelines may be inadvertently encouraging a “checklist” approach to reporting.

To refine local guidelines, regulators should shift the focus from suggesting lists of topics (which improves CMVs) to mandating rigorous determination processes (which improves MDQVs). Standard setters can learn that framework simplification is urgent; the “information overload” observed in this study stems from companies attempting to satisfy GRI, IIRC, and local guidelines simultaneously. Future guidelines should explicitly map how compliance with the new ISSB standards satisfies existing local requirements to reduce this redundancy.

5.1.2. Managerial Recommendations

For report preparers, specifically in the electric equipment sector, the study highlights a need to move away from “comprehensive” and towards “concise” reporting. To improve Materiality Disclosure Quality (MDQVs), managers should pay attention to the following:

- a) Clearer materiality mapping: Replace generic lists of issues with a dynamic materiality matrix that visually links specific ESG risks to their estimated financial impact on the firm.
- b) Quantification of targets: Move beyond narrative aspirations (e.g. “we strive to reduce emissions”), towards disclosing specific, time-bound quantitative targets (PTT) for social and governance indicators, not just environmental ones.
- c) Substantive dialogue: Disclose the outcomes of stakeholder engagement specifically, i.e. how feedback from investors or employees has caused a change in corporate strategy, rather than merely stating that a dialogue has taken place.

Our findings may differ from those of prior studies due to the specific choice of variables, the structure of the disclosure index, and the inherent subjectivity of the manual coding process. This study will benefit three groups of stakeholders: researchers in the CSR materiality area, standard setters in the CSR reporting field, and IR preparers of electric equipment sector. At present, there is a Global Sustainability Standards Board and IFRS foundation that are working on a mandatory reporting framework. Thus, perhaps incorporating the theoretical notion of “materiality” within a mandatory reporting setting and opening debates about a “qualitative threshold” might offer fertile grounds for future research – one that will also contribute to the creation of a “comparable frame”.

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Appendices

Appendix A. Materiality Coding Codebook (Excerpts): Examples of scoring criteria applied to Japanese electric equipment IRs

Variable	Score 0 (Absence)	Score 2 (General/ Narrative)	Score 4 (Very Detailed/ Strategic)
GCE (Greenhouse Gas Emissions)	No mention of emissions or climate change.	“We are striving to reduce CO2 emissions in our factories through energy-saving activities.” <i>(Narrative only, no data).</i>	“Scope 1 and 2 emissions were reduced by 14% vs. 2013 levels. We aim for Net Zero by 2050 using internal carbon pricing...” <i>(specific metrics, baselines, and targets).</i>
MDP (Materiality Determination Process)	No description of how material issues were selected.	“We identified material issues based on ISO 26000 and discussions with the board” <i>(process mentioned but opaque).</i>	“The process involved 4 steps: 1) Long-list creation via GRI/SASB, 2) Weighting by stakeholder surveys (n = 500), 3) Impact mapping on the X/Y matrix, 4) Final Board approval” <i>(replicable and transparent).</i>
PTT (Progress to Targets)	No targets mentioned.	“We aim to increase the number of female managers in the future.”	“Target: 15% female managers by 2025. Current status (2021): 8.5%. Key initiative: Mentorship program launched Q3.”
SCIM (Supply Chain Integrity)	No mention of supply chain management.	“We ask our suppliers to adhere to our CSR procurement guidelines.”	“We conducted CSR audits on 95 Tier-1 suppliers. 3 suppliers were identified as high-risk regarding human rights, and corrective action plans were enforced.”

Source: authors derived

Appendix B. CMVs' descriptive statistics and counts of scores

Group % rounded	Categorized materiality variable (CMV)	Descriptive statistics			Score count	
		%	Mean (Max 4)	SD	4	1&0
Environmental 69	GCE GHG and/or Chemicals Emissions.	87.93	3.52	0.99	22	1
	EM Energy Management (Consumption/ Efficiency)	76.72	3.07	0.96	13	1
	WWM Water and/or Wastage management	63.79	2.55	1.55	11	7

Group % rounded	Categorized materiality variable (CMV)	Descriptive statistics			Score count	
		%	Mean (Max 4)	SD	4	1&0
Environmental 69	HEWM Hazardous Material and/or electronic waste/waste management	74.14	2.97	1.15	12	4
	RM Recycling Management	42.24	1.69	1.37	4	14
Social 63	DS Data Security	44.83	1.79	1.24	3	12
	DISE Digital Inclusion and Social Enabling	80.17	3.21	0.82	13	0
Human 76	LPWC Labour Practice and Sates of Labours	82.76	3.31	0.85	15	1
	OHS Occupational Health and Safety	65.52	2.62	1.40	10	6
	EDI Employee Diversity and Inclusion	86.21	3.45	0.95	20	2
	TD Training and Development	68.97	2.76	1.12	9	4
Governance 61	BSD Board Structure and Diversity	92.24	3.69	0.54	21	0
	BC Board Compensation	78.45	3.14	1.22	16	3
	PCA Political Donation and Accountability	6.90	0.28	0.84	0	26
	ACB Anti-corruption and Bribery	64.66	2.59	1.18	6	4
Economic 87	BMPD Innovation Business Model and Product Design.	98.28	3.93	0.26	27	0
	SCIM Management and Supply Chain Integrity	75.86	3.03	1.02	10	3

Source: authors derived

Appendix C. Descriptive statistics and score counts of MDQVs

MDQVs	Descriptive statistics			Score count	
	%	Mean (Max 4)	SD	4	1&0
VCP Story of company or its unique process of value creation.	65.52	2.62	1.12	6	4

MDQVs	Descriptive statistics			Score count	
	%	Mean (Max 4)	SD	4	1&0
SRO Risk and opportunity system identification and description	76.72	3.07	1.00	12	3
PTT Plans and directions to objectives	88.79	3.55	0.87	21	2
MDP Determining and assessing materiality, engaging stakeholders	43.10	1.72	1.36	6	15
SMS Different section on material issues	56.90	2.28	1.60	10	11

Source: authors derived

Appendix D. Classifications of firms based on the perceived relevant ethnic majority materiality determinants: CMVs and MDQVs

Regularly high performers		DR: CMV > 70; MDQV > 70; Average > 70			
No	Company	CMV (%)	MDQV (%)	Average (%)	Difference (%)
1	Advantest Corporation	72.06	70.83	71.45	1.23
2	Alps Alpine Co. Ltd.	72.06	75.00	73.53	-2.94
3	Ricoh Company Ltd.	85.29	70.83	78.06	14.46
4	Seiko Epson Corporation	82.35	79.17	80.76	3.19
5	Sysmex Corporation*	80.88	70.83	75.86	10.05
Regularly low performers		DR: Average < 50			
No	Company	CMV (%)	MDQV (%)	Average (%)	Difference (%)
1	Casio Computers Co. Ltd.	48.53	37.50	43.01	11.03
2	Hamamatsu Photonics K. K.	39.71	29.17	34.44	10.54
3	JEOL Ltd.	55.88	25.00	40.44	30.88
4	NCXX Group Inc.	33.82	29.17	31.50	4.66
5	OSG Corporation Co. Ltd.*	48.53	41.67	45.10	6.86
6	Sanyo Denki Co. Ltd.	45.59	33.33	39.46	12.25
Average Performer		DR: MDQV < 70; Average > 60 and < 75			
No	Company	CMV (%)	MDQV (%)	Average (%)	Difference (%)
1	Anritsu Corporation	67.65	54.17	60.91	13.48
2	Fujitsu Ltd.	70.59	58.33	64.46	12.25
3	IBIDEN Co. Ltd.	70.59	54.17	62.38	16.42
4	JVC Kenwood Corporation	77.94	62.50	70.22	15.44

5	NEC	76.47	58.33	67.40	18.14
6	Nippon Chemi-Con Corporation	73.53	54.17	63.85	19.36
7	Omron Corporation	63.24	58.33	60.78	4.90
8	ROHM Co. Ltd.	80.88	62.50	71.69	18.38
9	Toshiba Corporation	73.53	58.33	65.93	15.20
CMV-heavy reporters		DR: CMV > 70; difference >20			
<i>No</i>	<i>Company</i>	<i>CMV (%)</i>	<i>MDQV (%)</i>	<i>Average (%)</i>	<i>Difference (%)</i>
1	Hitachi Ltd.	85.29	58.33	71.81	26.96
2	Kyocera Corporation	83.82	58.33	71.08	25.49
3	Mabuchi Motor Co. Ltd.	88.24	66.67	77.45	21.57
4	Maxell Holdings Ltd.	79.41	50.00	64.71	29.41
5	Nichicon Corporation	73.53	45.83	59.68	27.70
6	Nisshinbo Holdings Inc.	76.47	45.83	61.15	30.64
7	Nitto Kogyo Corporation	86.76	66.67	76.72	20.10
8	Toshiba Tec Corporation	85.29	54.17	69.73	31.13
The outlier					
<i>SL</i>	<i>Company</i>	<i>CMV (%)</i>	<i>MDQV (%)</i>	<i>Average (%)</i>	<i>Difference (%)</i>
1	Minebea Mitsumi Inc.	51.47	70.83	61.15	-19.36
Total 29 Companies Average		69.98	55.17	-----	14.81

Source: authors derived

Note: DR – decision rule.