Evaluating Climate-Related Disclosures by New Zealand Climate Reporting Entities

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A Thesis submitted to

Auckland University of Technology

In partial fulfilment of the requirements for the degree of

Master of Business (MBus)

2026

School of Business

Abstract

This thesis evaluates climate-related disclosure practices of New Zealand Climate Reporting Entities (CREs) before and during the early implementation of Aotearoa New Zealand Climate Standards (NZ CS 1–3). New Zealand provides a valuable setting to examine how organisations respond as climate reporting transitions from voluntary to mandatory disclosure. While prior research suggests mandatory sustainability reporting influences disclosure practices, evidence on climate reporting adoption remains limited. The study assesses three dimensions of reporting practice: disclosure extent, thematic content, and readability.

Using a mixed-methods research design, the thesis constructs a disclosure corpus from 95 CREs and 667 public reports issued between 2021 and 2024. Python-based sentence-level keyword matching is used to extract climate-related narratives and measure disclosure extent across firm-years and report types. Thematic analysis is applied to 2024 disclosures using the four pillars of NZ CS 1: governance, strategy, risk management, and metrics and targets. Readability is assessed for 47 firms, predominantly listed entities, using the Coleman-Liau Index (CLI) and the Dale-Chall Readability Score (DCRS).

The results show that climate-related disclosures increased substantially following the implementation of NZ CS 1–3. The total number of extracted climate-related words increased from 100,177 in 2021 to 1,362,425 in 2024. The sharpest increase occurred in 2024, which was the first full mandatory reporting cycle captured in the sample. The thematic analysis of 2024 climate-related disclosures indicates that thematic content was not evenly distributed across the four NZ CS 1 pillars or across the 12 themes developed in this study. GHG emissions and reporting basis, climate impacts and exposure, and transition planning were the most prevalent themes, while risk response and review appeared less frequently. Readability analysis shows that mean CLI and DCRS values increased from 2021 to 2024, while median values followed a similar but more moderate pattern. As higher scores on both measures indicate greater textual difficulty, this pattern shows lower readability within the analysed sample over the study period.

The findings are interpreted through institutional and legitimacy theory. The increase in disclosure extent is consistent with the coercive pressures created by NZ CS 1–3's mandatory reporting requirements. Normative and mimetic pressures may help explain the uneven thematic content, given differences in the availability of professional guidance and reporting precedents. Legitimacy theory further indicates that some themes offered greater value in demonstrating accountability to stakeholders. Lower readability is consistent with the technical demands of climate reporting and efforts to establish credibility during early implementation. The study contributes early evidence on mandatory climate reporting and provides a theory-based explanation for variation in thematic disclosures and readability during regulatory transition.

Keywords: climate-related disclosure, mandatory climate reporting, Aotearoa New Zealand Climate Standards, textual analysis, disclosure readability

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List of Abbreviations

CLI: Coleman-Liau Index

CREs: Climate Reporting Entities

DCRS: Dale-Chall Readability Score

Env_Sens: environmental sensitivity

FE: fixed effects

GHG: greenhouse gas

LEV: leverage

LSEG: London Stock Exchange Group

NZ CS: Aotearoa New Zealand Climate Standards

RE: random effects

ROA: return on assets

SD: standard deviation

TCFD: Task Force on Climate-related Financial Disclosures

XRB: External Reporting Board

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signature: 

Date: **20 July 2026**

Chapter 1: Introduction

1.1 The Shift to Mandatory Climate Disclosure

Climate-related disclosure has become an increasingly important component of corporate reporting. This reflects a shift in how regulators, investors, and reporting entities understand climate change. Climate change is no longer viewed only as an environmental or social responsibility issue. Instead, climate-related risks and opportunities are also recognised as factors that may affect corporate assets, business models, financing decisions, and strategies (Bolton & Kacperczyk, 2021; Krueger *et al*., 2020; Task Force on Climate-related Financial Disclosures [TCFD], 2017). As these risks become more prominent, stakeholders have placed greater pressure on firms to explain how they govern, manage, and measure climate-related matters.

Early voluntary disclosure played a fundamental role in making climate-related information more accessible to investors and other stakeholders (Hahn & Kühnen, 2013; Kolk *et al*., 2008). However, these disclosures largely depended on management discretion. Firms could decide which climate-related information to disclose, where to disclose it, and how much detail to provide. Prior research shows that voluntary disclosure may be selective, difficult to compare, and influenced by managerial attempts to present an idealised view of corporate accountability and environmental responsibility (Boiral, 2013; Hahn & Kühnen, 2013; Michelon *et al.*, 2015).

The emergence of mandatory climate-related disclosure regimes was intended to address these limitations. Mandatory reporting regimes aim to reduce management discretion by requiring firms to disclose climate-related information within a standardised framework. This is intended to improve the consistency, comparability, and completeness of reporting (Christensen *et al.*, 2021; Fiechter *et al.*, 2022). This shift also reflects broader developments in non-financial reporting.

New Zealand provides a noteworthy empirical setting for examining this regulatory development. It was the first country to pass legislation requiring large financial market participants to disclose climate-related risks and opportunities (Clark & Shaw, 2021). The Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021 amended the Financial Markets Conduct Act 2013 and established the statutory basis for mandatory climate-related disclosure in New Zealand (Financial Markets Authority [FMA], 2021; Ministry of Business, Innovation and Employment [MBIE], 2024). Under this legislative framework, New Zealand Climate Reporting Entities (CREs) are required to prepare annual climate statements in accordance with the Aotearoa New Zealand Climate Standards (NZ CS 1–3) issued by the External Reporting Board. NZ CS 1 sets out disclosure requirements relating to governance, strategy, risk management, and metrics and targets. NZ CS 2 provides adoption provisions, while NZ CS 3 establishes the general requirements for climate-related disclosures (External Reporting Board [XRB], 2022a). These standards apply to reporting periods beginning on or after 1 January 2023. This provides a clear regulatory framework for examining how corporate reporting practices change when climate-related disclosure moves from a primarily voluntary practice to a mandatory reporting regime.

Therefore, New Zealand's climate disclosure regime is significant not only because it requires climate-related information to be disclosed, but also because it structures how such information is presented. Against this regulatory backdrop, New Zealand offers a timely setting for examining how climate-related reporting practices evolved during the early implementation of mandatory climate-related disclosure.

1.2 Evaluating Climate-related Reporting Practices

The Aotearoa New Zealand Climate Standards have shifted climate-related disclosure from mainly voluntary reporting to a formal, mandatory requirement. Prior evidence from the field of mandatory non-financial reporting suggests that the extent of disclosure often increases after new requirements are introduced (Ottenstein *et al.*, 2021; Papa *et al.*, 2022; Perera *et al.*, 2019). However, the informational value of disclosure is not directly related to its length. Longer reports may remain general, become more technical, and be more difficult for users to understand.

This issue has been widely recognised in accounting disclosure research. Narrative disclosure can reduce information asymmetry, but if it is too lengthy, complex, or difficult to understand, it may increase users' processing costs and reduce information accessibility (Li, 2008; Loughran & McDonald, 2014). This is because climate-related disclosure often requires firms to navigate among several types of information: governance processes, physical and transition risks, scenario-based assumptions, emissions measurement, and targets (TCFD, 2017; XRB, 2022a). As a result, even if disclosure formally complies with reporting requirements, it may still be difficult to interpret (Hahn *et al.*, 2015; Nilipour *et al.*, 2020). This suggests that the effectiveness of disclosure depends not only on the quantity of information provided, but also on how that information is communicated.

Beyond mandatory disclosures, the Aotearoa New Zealand Climate Standards do not treat presentation as an irrelevant formatting issue. NZ CS 3 requires that climate-related disclosures be understandable, clear, concise, and sufficiently connected for primary users (XRB, 2022d). Since NZ CS 1–3 introduced both mandatory requirements and presentation principles, New Zealand provides an appropriate setting for examining whether regulated climate reporting results in more disclosure, what information is disclosed, and whether the resulting narratives are readable for users. Overall, this study examines climate-related disclosure from three related dimensions: the extent of disclosure, the themes of disclosure, and the readability of disclosure narratives.

1.3 Research Motivation and Questions

Although climate-related disclosure has received increasing attention in accounting research, several gaps remain in the literature. Prior accounting research suggests that mandatory non-financial disclosure requirements are associated with increases in reporting quantity (Ottenstein *et al.*, 2021; Papa *et al.*, 2022; Perera *et al.*, 2019). While this evidence is important, it primarily examines whether firms disclose more information after the introduction of regulation. Less is known about how mandatory climate reporting is reflected in corporate disclosure practices. In particular, it remains unclear whether climate-related disclosures are dispersed across governance, strategy, risk management, and metrics and targets, or remain concentrated

in specific areas. Another limitation concerns the readability of disclosure. Previous studies have mainly examined the readability of voluntary environmental and sustainability reporting (Li, 2008; Loughran & McDonald, 2014; Nilipour *et al.*, 2020). However, evidence on whether mandatory climate-related disclosure requirements affect the readability of such disclosures remains limited.

As discussed earlier, the introduction of NZ CS 1–3 provides a particularly useful setting for examining these issues. It allows this thesis to examine climate-related reporting practices during the early implementation of the mandatory regime. This setting is particularly significant because it allows observation of how CREs respond as climate-related disclosure shifts from a voluntary practice to a standards-based mandatory reporting requirement. Evidence from this setting can contribute to the emerging literature on mandatory climate reporting by providing early empirical insights into how CREs disclose climate-related information under NZ CS 1–3.

A further limitation is the evaluation of climate-related disclosure. Prior studies have generally examined disclosure extent, disclosure content, and readability as separate dimensions of reporting practice (Clarkson *et al.*, 2008; Loughran & McDonald, 2014; Ottenstein *et al.*, 2021). While this provides useful evidence, it is not comprehensive. Studies that focus on individual dimensions offer limited insight into mandatory climate reporting as an integrated disclosure practice. The regulatory effect may manifest not only in the extent of disclosure but also in the thematic content and narrative readability. Therefore, this thesis addresses this limitation by examining three interrelated dimensions of disclosure: disclosure extent, thematic content, and readability. In doing so, it provides a more comprehensive understanding of climate-related reporting practice.

In addition, this study has practical relevance. For regulators and standard-setters, the findings provide evidence of how mandatory climate reporting is reflected in disclosure practice during the early implementation of NZ CS 1–3. More specifically, the study shows whether the regime is associated with broader climate-related disclosure, how disclosure is distributed across key reporting pillars, and whether the resulting narratives remain readable for users. For reporting entities, the findings may help identify which climate-related themes are widely reported, which are less commonly reported, and how readable the disclosure text is. For investors and other users of climate-related information, this study provides evidence on whether the expansion of climate reporting is accompanied by more extensive, thematically structured, and readable disclosures.

This thesis aims to evaluate CRE climate-related disclosure practices before and after the implementation of Aotearoa New Zealand Climate Standards 1–3. The study addresses the following three research questions:

RQ1: What is the extent of climate-related disclosure by New Zealand CREs before and after the introduction of NZ CS 1–3?

RQ2: What are the prevailing themes within climate-related disclosures by New Zealand CREs during the first full mandatory reporting period (2024)?

RQ3: How has the readability of climate-related reporting by New Zealand CREs changed following the implementation of NZ CS 1–3?

These questions follow a progressive logic. RQ1 first establishes an empirical baseline by examining the extent of climate-related disclosure before and after the introduction of NZ CS 1–3. Then, RQ2 shifts from disclosure extent to disclosure content by identifying which climate-related themes appeared most frequently during the first full mandatory reporting period (2024). Building on this, RQ3 adds a communication dimension by examining changes in the readability of climate-related disclosures. This structure enables the thesis to evaluate mandatory climate reporting as a disclosure practice across three complementary levels.

1.4 Overview of the Research Design

To address these questions, this thesis examines climate-related disclosures by New Zealand CREs from 2021 to 2024. This period covers two years before and two years after the implementation of Aotearoa New Zealand Climate Standards. Consequently, it provides a useful window for comparing climate-related disclosure practices before and after the introduction of mandatory reporting. This thesis constructs a climate-related disclosure corpus comprising 667 public reports issued by 95 CREs between 2021 and 2024.

This research adopts a mixed-methods approach to examine different but related dimensions of disclosure practice. The empirical analysis is organised around three research questions. RQ1 uses Python-based sentence-level keyword matching to identify climate-related narrative text and measure the extent of disclosure. The extracted text is analysed at both the report and firm-year levels, enabling the study to examine changes in disclosure over time and variation across report types and industries. RQ2 adopts thematic analysis to examine climate-related disclosures in 2024. RQ3 focuses on the readability of disclosure. It uses established readability measures, including the Coleman-Liau Index and the Dale-Chall Readability Score, to examine whether climate-related narrative disclosure became easier or more difficult to read after the implementation of NZ CS 1–3 (Coleman & Liau, 1975; Dale & Chall, 1948).

The analysis is guided by institutional theory and legitimacy theory. Institutional theory suggests that the Aotearoa New Zealand Climate Standards introduced formal reporting expectations, creating pressure for CREs to align with the new institutional regime (DiMaggio & Powell, 1983). Legitimacy theory provides an additional perspective for interpreting how CREs present climate-related information in response to stakeholder expectations and legitimacy concerns (Dowling & Pfeffer, 1975; Suchman, 1995). Together, these theoretical perspectives support the empirical analysis by linking changes in the extent of disclosure, thematic content, and readability to the institutional and legitimacy pressures associated with mandatory climate reporting in New Zealand.

1.5 Outline of the Thesis

The remainder of this thesis is organised into five chapters. Chapter 2 reviews the literature on climate-related disclosure, mandatory reporting, disclosure extent, thematic analysis, and readability, and develops the theoretical framework. Chapter 3 outlines the research design, including the sample, text extraction procedure,

thematic coding method, readability measures, and statistical models. Chapter 4 presents the findings for the three research questions. Chapter 5 discusses the relationship between the research findings and the prior literature and theory. Chapter 6 concludes the thesis by summarising the main findings, contributions, implications, and limitations.

Chapter 2: Literature Review

2.1 Climate-related Disclosure and Corporate Reporting

In recent years, climate change has become widely recognised as a major issue facing contemporary firms, as it affects business operations, asset values, supply chains, financing conditions, and long-term strategic resilience (Howard-Grenville *et al.*, 2014; Wright & Nyberg, 2017). As entities in the social economy, firms should also take important responsibilities in responding to climate change (Chen & Han, 2025; Duan *et al.*, 2025; Tang *et al.*, 2025). As climate-related issues have become more deeply embedded in corporate reporting expectations, firms are increasingly expected to explain how they identify, assess, and manage climate-related risks and opportunities (Carney, 2015; TCFD, 2017). Climate-related disclosure typically covers climate governance, strategy, risk management, and climate-related metrics and targets (Amel-Zadeh & Tang, 2025; TCFD, 2017).

The development of climate-related information disclosure is closely linked to the broader evolution of environmental and sustainability accounting. Historically, the rise of corporate climate-related disclosure can be traced to several key turning points. Beginning in the 1960s and 1970s, accounting decisions began to take environmental impacts into account and to identify various approaches to accounting for them, giving rise to environmental accounting (Gulluscio *et al.*, 2020; Linnenluecke *et al.*, 2015). From the late 1980s to the early 1990s, the literature highlighted the need to incorporate environmental and social dimensions into accounting theory and practice (Elkington, 1998; Gray, 1990). In the 1990s, voluntary corporate environmental and sustainability reporting became more visible and increasingly formalised as a reporting practice (Gray *et al.*, 1995; Kolk, 2004).

As the economic impacts of climate change become increasingly apparent, firms face growing external pressure to improve their disclosure of climate-related information. Numerous scientific and economic analyses indicated that continued climate change could impose substantial costs on firms and the financial system (Carleton & Hsiang, 2016; Nordhaus, 1991; Tol, 2009). Consequently, investors, regulators, and other stakeholders began to view climate risk as a significant financial risk that could erode asset values and disrupt supply chains (Albertini, 2013; Javadi & Masum, 2021). Many investors and shareholders are increasingly demanding that firms provide standardised, decision-useful climate information to assess their climate-related risks and compare corporate climate strategies of their peers (Ehalaiye *et al.*, 2025). This growing investor demand marked a critical shift. Climate-related disclosure is no longer viewed merely as social responsibility or reputational enhancement but has become a prerequisite for risk assessment and capital allocation in markets (Amel-Zadeh & Serafeim, 2018; Ilhan *et al.*, 2023).

However, the importance of climate-related disclosure does not mean that such disclosures are necessarily useful. Their usefulness depends not only on whether firms disclose climate-related information, but also on the extent of information provided, how the information is organised, and whether users can read and understand it. These issues are central to this thesis, which examines the extent, thematic structure, and

readability of climate-related information disclosed by New Zealand CREs under the Aotearoa New Zealand Climate Standards.

2.2 Development of Climate Disclosure Frameworks

2.2.1 Voluntary Climate-related Disclosure Initiatives

Before dedicated climate-related disclosure frameworks emerged, corporate environmental and climate reporting developed largely through voluntary, multi-stakeholder initiatives (Brown *et al.*, 2009; Kolk *et al.*, 2008). These initiatives did not form a single, coordinated reporting system. Instead, different organisations developed standards, frameworks, and disclosure platforms for different purposes and intended users (Brown *et al.*, 2009; Kolk *et al.*, 2008). This section groups these contributions into three related areas of development: the measurement of greenhouse gas emissions (GHG), the organisation of environmental information in corporate reports, and investor demand for climate-related information.

The first area of development concerns the measurement of greenhouse gas emissions. The GHG Protocol Corporate Accounting and Reporting Standard, jointly developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), provides principles and methods for preparing corporate GHG inventories (WRI & WBCSD, 2004). The standard distinguishes between direct emissions from sources owned or controlled by a firm (Scope 1) and indirect emissions arising from purchased electricity, heat, or steam (Scope 2) (WRI & WBCSD, 2004). The subsequent GHG Protocol scope 2 guidance and Greenhouse Gas Protocol corporate value chain (Scope 3) accounting and reporting standard extended this approach, incorporating purchased energy and upstream and downstream activities into a common method of corporate emissions accounting (WRI & WBCSD, 2004, 2011, 2015). In the same period, the International Organisation for Standardisation (ISO) 14064-1 outlined in an internationally standardised form the principles and requirements for quantifying and reporting organisation-level GHG emissions and removals (ISO, 2006, 2018). ISO 14064-1, together with the GHG Protocol Corporate Standard, form a complementary set that provides comprehensive guidance for monitoring and reporting GHG emissions. These standards have achieved broad international recognition and use, including in New Zealand (Ministry for the Environment, 2008).

The second area of development concerns how environmental information is organised and presented in corporate reporting. The Global Reporting Initiative (GRI) developed voluntary sustainability reporting guidelines that incorporated environmental indicators relating to energy, emissions, governance processes, and other organisational impacts (GRI, 2002, 2006). Drawing on the principles and structure of financial reporting, the GRI promoted "comparable, verifiable, and capital provider-oriented information narratives", a mechanism that has long been regarded as central to the institutionalisation of sustainability reporting (Brown *et al.*, 2009; Etzion & Ferraro, 2010; GRI, 2006). The Climate Disclosure Standards Board (CDSB) further advanced the concept of integrating environmental and climate information within mainstream corporate reporting (CDSB, 2012). Building on this development, the International Integrated Reporting Framework connected information on governance, strategy, and organisational prospects by focusing on short-, medium-, and long-term value

creation (International Integrated Reporting Council [IIRC], 2013). Collectively, these guidelines and frameworks provide firms a structured approach to reporting environmental information alongside broader economic and social information, thereby supporting the standardisation and international diffusion of sustainability reporting practices (Brown *et al.*, 2009; Cheng *et al.*, 2014; KPMG, 2020).

The third area of development reflects growing investor demand for corporate climate-related information. The Carbon Disclosure Project (CDP) established an investor-backed platform that asked firms to disclose information on their GHG emissions and responses to climate change (Kolk *et al.*, 2008). Its questionnaire uses a standardised disclosure format to collect information on emissions, climate-related risks and opportunities, corporate governance arrangements, and response measures (CDP, 2011; Kolk *et al.*, 2008). Previous research suggests that CDP effectively mobilised the influence of institutional investors to encourage firms to disclose a broad range of climate-related information, while also providing a basis for comparison across firms (Carbon Disclosure Project, 2011; Kolk *et al.*, 2008; Stanny & Ely, 2008).

In summary, these early voluntary initiatives laid the foundations for the subsequent development of climate-related disclosure. At the technical level, accounting standards such as the GHG Protocol and ISO 14064-1 addressed the fundamental question of how climate-related matters should be measured by providing firms with common measurement tools. At the institutional level, reporting frameworks developed by organisations such as the GRI, CDSB, and IIRC gradually established conventions governing how such information should be communicated, enabling climate-related information to become part of mainstream corporate reporting practice. At the market level, investor-led information-request platforms such as CDP translated the dispersed information demands of capital providers into more concrete disclosure pressure, creating an external rationale for why firms should disclose. Overall, early voluntary climate disclosure not only responded to the capital market's pressing demand for information about climate risk at the time but also provided valuable experience for the further development of climate-related disclosure.

2.2.2 From TCFD to the ISSB

Following earlier voluntary initiatives, the Financial Stability Board (FSB) established the Task Force on Climate-related Financial Disclosures (TCFD) in 2015 to develop a set of voluntary and consistent recommendations for climate-related financial disclosure (Financial Stability Board [FSB], 2015). The TCFD published its final recommendations in 2017 to meet the information needs of investors, lenders, and insurance underwriters (Braasch & Velte, 2023; Ding *et al.*, 2023; Ngo *et al.*, 2023). The TCFD recommendations organise climate-related disclosure around four thematic areas: governance, strategy, risk management, and metrics and targets. These areas cover how organisations oversee climate-related matters, assess their implications for business and financial planning, manage climate-related risks, and report relevant metrics and targets (TCFD, 2017).

In 2023, the TCFD was disbanded after completing its mandate, and the International Financial Reporting Standards (IFRS) Foundation took over responsibility for monitoring progress in climate-related disclosure (IFRS Foundation, 2023a). In June 2023, the International Sustainability Standards Board (ISSB), as the

independent standard-setting body of the IFRS Foundation, issued IFRS S1: General Requirements for Disclosure of Sustainability-related Financial Information, and IFRS S2: Climate-related Disclosures, building on the TCFD recommendations (IFRS Foundation, 2023a, 2023b). IFRS S1 sets out general disclosure requirements for sustainability-related financial information, while IFRS S2 applies these requirements to climate-related disclosure (IFRS Foundation, 2023a, 2023b).

This development provides the international context for the New Zealand regime examined in this thesis. The TCFD established the framework for climate-related financial disclosure, and the ISSB incorporated it into the IFRS sustainability disclosure standards. The ISSB provides a global baseline for sustainability-related disclosure, but its influence on corporate reporting depends on how individual jurisdictions incorporate it into domestic regulatory requirements.

2.3 From Voluntary to Mandatory Climate-related Disclosure

2.3.1 Limitations of Voluntary Climate-related Disclosure

Based on the voluntary initiatives and international frameworks outlined above, an increasing number of studies have examined whether voluntary mechanisms can reliably produce decision-useful climate information.

Voluntary climate disclosure is influenced by strategic discretion. Firms can decide whether to disclose, what to disclose, and how to present climate-related information (Chen & Bouvain, 2009). This discretion allows firms to adapt their communication approaches to specific organisational contexts and stakeholder groups (Dubbink *et al.*, 2008). Furthermore, firms with strong environmental performance may be more motivated to disclose more information, as disclosure can help distinguish them from poorer performers, enhance reputation, reduce information asymmetry, and potentially lower the cost of capital (Al-Tuwaijri *et al.*, 2004; Clarkson *et al.*, 2008; Hummel & Schlick, 2016; Qian & Schaltegger, 2017; Verrecchia, 1983).

However, various empirical and critical research have pointed out that the voluntary disclosure framework is flawed. The most common criticism is that voluntary disclosure is selective and often self-serving, with omissions (Armour *et al.*, 2022; Bewley & Li, 2000). Firms participating in voluntary reporting typically show a systematic positivity bias. This refers to their tendency to report favourable or neutral information, while ignoring or downplaying the negative aspects of environmental performance (Deegan & Gordon, 1996; de Freitas Netto *et al.*, 2020; Lodhia *et al.*, 2022). Voluntary disclosure also allows firms to highlight positive initiatives, vague commitments, and unsubstantiated claims, while giving less attention to significant climate risks (Mahoney *et al.*, 2013; Michelon *et al.*, 2015). Clarkson *et al.* (2008) describe these actions as a "self-serving disclosure strategy," rather than the provision of comprehensive, decision-useful information (Cho & Patten, 2007; Hahn & Kühnen, 2013). Related studies indicate that many voluntary climate disclosures rely on symbolic "impression management" techniques, intended to shape external perceptions rather than reflect substantive change (Hahn *et al.*, 2015; Ilhan *et al.*, 2023; Nguyen, 2025). As a result, voluntary reports often provide an incomplete picture of firms' climate-related impacts and vulnerabilities.

Comparability and consistency are another major weakness of voluntary disclosure. Without mandatory and standardised frameworks, firms may take different approaches to climate disclosure with different formats, metrics, scopes, and time horizons. As a result, it is difficult for investors, analysts, and other stakeholders to compare firms across industries or over time (Andrew & Cortese, 2012; Kolk *et al.*, 2008; Solomon *et al.*, 2011). These differences reduce the usefulness of disclosure for investment decisions and accountability and also limit meaningful benchmarking and the aggregation of climate-related risk across markets (Christensen *et al.*, 2021; Hahn & Kühnen, 2013).

Assurance is often viewed as a way to strengthen the credibility of voluntary sustainability and climate-related disclosure. However, its effectiveness depends on the scope, independence, and quality of the assurance engagement. Prior research shows that firms facing stricter stakeholder scrutiny are more likely to obtain assurance, but assurance practices remain uneven across firms and reports (Perego & Kolk, 2012). Some reports are not assured, while others receive limited assurance that may not cover narrative climate-related statements. This reduces the ability of assurance as a consistent market-based remedy in voluntary reporting settings (Casey & Grenier, 2015; Cohen & Simnett, 2015). In the absence of assured disclosures, firms may be more likely to use environmental-related information for symbolic or legitimacy-seeking purposes rather than transparent accountability (Cho *et al.*, 2015; de Freitas Netto *et al.*, 2020; Laufer, 2003; Qian & Schaltegger, 2017).

Overall, the literature suggests that the central weakness of voluntary climate-related disclosure is not the absence of reporting activity, but the quality of information is often uneven. The voluntary climate-related disclosure can be selective, difficult to compare, weakly verified, or too general for users' decisions. These concerns provide the basis for considering mandatory reporting as a regulatory response.

2.3.2 Mandatory Climate-related Disclosure and Reporting Practice

The limitations of voluntary climate-related disclosure have shifted attention to the role of regulation. If disclosure remains at the discretion of firms, the climate-related information provided may be selective, inconsistent, or difficult to compare (Andrew & Cortese, 2012; Kolk *et al.*, 2008). Mandatory requirements can limit some managerial discretion and make information more accessible and more comparable across firms (Leuz & Wysocki, 2016).

Existing research suggests that one of the most significant effects of mandatory reporting is an increase in the quantity of disclosures (Chauvey *et al.*, 2015; Ottenstein *et al.*, 2021; Papa *et al.*, 2022). Fiechter *et al.* (2022) examined the EU Corporate Social Responsibility (CSR) Directive and found that affected firms improve the transparency in reporting practices, including report publication, use of reporting guidelines, reporting scope, and assurance. They also found that firms subject to mandatory disclosure increased their CSR activities, particularly among firms with previously low levels of CSR and performance. This suggests that mandatory reporting can influence corporate behaviour, rather than merely expanding the scope of disclosure. Similarly, Downar *et al.* (2021) examined the UK mandatory GHG reporting requirement and found that affected firms reduced emissions relative to a control group. Bauckloh *et al.* (2023) reached similar conclusions by examining

the relationship between mandatory climate reporting and corporate carbon emissions performance. Such research indicates that the effects of mandatory reporting may extend to firms' actual behaviour, rather than only to disclosure itself.

Evidence on whether mandatory reporting improves the quality of non-financial information remains mixed. Mion and Loza Adaui (2019) found that mandatory non-financial disclosure introduced under EU Directive 2014/95/EU improved the quality of sustainability reporting by Italian and German firms. Carmo and Ribeiro (2022), drawing on evidence from Portuguese listed companies, reached a more cautious conclusion. They show that quality improvements were mainly concentrated in the first year of implementing Directive 2014/95/EU and among firms that had not previously disclosed non-financial information. Carungu *et al.* (2020), based on evidence from Italy, reached a different conclusion, arguing that the shift from voluntary to mandatory non-financial disclosure does not necessarily improve reporting quality.

The benefits of mandatory disclosure should not be overstated. Breijer and Orij (2022) found that firms that disclose information only when required are more likely to use boilerplate language and increase information asymmetry. Christensen *et al.* (2021) similarly warned that firms may satisfy mandatory disclosure requirements through generic, vague and highly uninformative boilerplate disclosures. Criado-Jiménez *et al.* (2008) also argue that even under mandatory requirements, firms may comply only partially, omit unfavourable information, or adopt concealment strategies to protect their legitimacy.

Overall, the literature suggests that mandatory reporting can expand the extent of disclosure and, in some cases, influence firms' potential behaviour. However, evidence on disclosure quality remains mixed. Research also shows that firms may rely on boilerplate language or omit unfavourable information under mandatory requirements. Therefore, it is necessary to examine the effects of mandatory climate disclosure by analysing the actual reporting practices of firms subject to mandatory disclosure requirements.

2.3.3 The New Zealand Climate-related Disclosure Regime

The evidence reviewed above suggests that the effects of mandatory reporting are mixed. One possible explanation is that mandatory reporting requirements differ across jurisdictions in their design, implementation, and enforcement (Christensen *et al.*, 2021).

A growing number of jurisdictions now require mandatory disclosure of climate-related information, although they through different laws, standards, and reporting requirements. In the United Kingdom, large companies and limited liability partnerships are required to provide climate-related financial disclosures that are broadly consistent with the TCFD recommendations (Department for Business, Energy & Industrial Strategy [BEIS], 2022). Australia has introduced mandatory climate-related financial reporting through a phased regime, with the first reporting requirements applying to financial years beginning on or after 1 January 2025 (Australian Securities and Investments Commission [ASIC], 2025). In the European Union, climate disclosure has been incorporated into the broader CSR Directive and European Sustainability Reporting Standards, where climate-related matters are addressed as part of broader sustainability reporting (European Parliament & Council of the European Union, 2022).

New Zealand has also followed this international trend by establishing its own mandatory climate-related disclosure regime. This regime applies to climate reporting entities (CREs), as defined in the Financial Markets Conduct Act 2013, and amended by the Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021. CREs include all listed equity and debt issuers; registered banks, licensed insurers, and credit unions that meet large size thresholds; and managers of registered investment schemes with more than $1 billion in assets (Financial Markets Conduct Act 2013, s 461O). CREs are required to prepare climate statements for accounting periods beginning on or after 1 January 2023 and to report in accordance with the Aotearoa New Zealand Climate Standards issued by the External Reporting Board (XRB). The XRB describes these standards as New Zealand's mandatory climate-related disclosure standards and states that they have a high degree of interoperability with the TCFD recommendations and the ISSB standards (XRB, 2023).

Within the Aotearoa New Zealand Climate Standards, NZ CS 1 is the main disclosure standard. It requires CREs to disclose material information about climate-related risks and opportunities across governance, strategy, risk management, and metrics and targets. Its objective is to provide primary users with the information they need to assess an entity's strategic response and make informed decisions (XRB, 2022b). NZ CS 2 recognises that entities may need time to develop the capabilities required for high-quality reporting and that some disclosures are inherently complex. Therefore, it provides adoption provisions, including exemptions and transitional measures, that allow first-time reporting entities to phase in some requirements (XRB, 2022c). NZ CS 3 sets out general requirements for climate-related disclosures, including fair presentation, materiality, reporting entity boundaries, and the presentation of climate statements (XRB, 2022d).

These standards provide a common reporting framework for CREs while also allowing some transitional flexibility during the initial application period. Consequently, the regime offers a specific setting for examining how CREs apply mandatory climate-related disclosure requirements in practice.

2.4 Disclosure Extent in Climate-related Reporting

2.4.1 Measuring Disclosure Extent

Prior research on social, environmental, and sustainability reporting commonly uses disclosure extent to measure the amount of information disclosed by firms (Hooks & van Staden, 2011; Milne & Adler, 1999). Disclosure extent is typically measured through content analysis, using metrics such as the number of sentences, word counts, page counts, or the amount of report space devoted to specific topics. In this thesis, "extent" refers specifically to the disclosure quantity. Hooks and van Staden (2011) compared several measures of environmental disclosure extent, including number of sentences, page counts, and the proportion of report space. Beck *et al.* (2010) also demonstrated how to analyse environmental reports using content-based measures of disclosure extent. These studies suggest that disclosure extent can be examined as an observable characteristic of reporting practices.

2.4.2 Mandatory Reporting and Disclosure Extent

Prior studies have generally found that mandatory reporting requirements can increase the extent of disclosure. Chauvey *et al.* (2015) examined the French Nouvelles Régulations Économiques law, which required listed companies to disclose social and environmental information. They measure CSR disclosure partly through the reporting space devoted to CSR information and find that this space increased after the law was introduced. Their study provides early evidence that regulation can increase the amount of non-financial information disclosed in corporate reports.

Evidence from the European Union points in a similar direction. Ottenstein *et al.* (2021) examined Directive 2014/95/EU and found that the shift from voluntary to mandatory non-financial reporting increased the quantity of sustainability disclosure. Papa *et al.* (2022), focusing on Italian environmentally sensitive industries, also found that mandatory implementation of the EU Directive increased the extent of environmental disclosure. These studies suggest that mandatory non-financial and environmental reporting requirements are associated with greater disclosure extent.

Evidence related to climate change is relatively limited but consistent with this overall trend. Perera *et al.* (2019) examined Australia's National Greenhouse and Energy Reporting Act and found that firms affected by the legislation disclosed more environmental information than unaffected firms. At the same time, their study provides climate-related evidence that mandatory reporting requirements can be associated with an increase in the extent of disclosure.

2.4.3 Disclosure Extent in the New Zealand Setting

The above studies suggest that when non-financial or environmental reporting becomes mandatory, firms often disclose more information (Chauvey *et al.*, 2015; Ottenstein *et al.*, 2021; Papa *et al.*, 2022). However, this evidence primarily comes from CSR, non-financial, and environmental reporting regimes outside New Zealand. Less is known about whether a similar pattern has emerged under New Zealand's mandatory climate-related disclosure regime.

Furthermore, examining disclosure extent also helps explain how firms respond to new mandatory disclosure requirements (Ottenstein *et al.*, 2021; Papa *et al.*, 2022). Determining whether disclosure extent has changed provides a basis for the subsequent analysis of disclosure themes and readability (Bochkay *et al.*, 2023). This leads to the following research question:

RQ1: What is the extent of climate-related disclosure by New Zealand CREs before and after the introduction of NZ CS 1–3?

2.5 Thematic Content of Climate-related Disclosure

2.5.1 From Disclosure Extent to Disclosure Content

Beyond increasing the amount of disclosure, mandatory reporting requirements may also change the way firms organise and present their disclosure. Mandatory regimes typically reduce some managerial discretion through

a standardised reporting framework, requiring firms to provide information on specified disclosure areas (Christensen *et al.*, 2021; Leuz & Wysocki, 2016). However, a standardised framework does not mean that all disclosure areas will be represented to the same extent in practice. This is particularly important for this study because RQ1 can only show whether the extent of climate-related disclosure changed. It cannot show whether disclosure content was concentrated around particular themes. In this thesis, thematic content refers to the substantive climate-related topics that appear within disclosure texts. RQ2 uses thematic content analysis to further examine which climate-related themes appear most prevalent in CREs' disclosure texts. This shifts the focus of the analysis from whether CREs disclosed more climate-related information to whether climate-related disclosure in 2024 was focused on particular themes.

2.5.2 The Four-Pillar Structure for Climate-related Disclosure

Climate-related disclosure is not a single, undifferentiated body of information. It is organised around several connected reporting areas. The TCFD recommendations organise climate-related financial disclosure into four areas: governance, strategy, risk management, and metrics and targets (TCFD, 2017). NZ CS 1 adopts the same four-pillar structure and requires CREs to disclose material information about climate-related risks and opportunities across these areas (XRB, 2022b).

Table 2.1

NZ CS 1 Disclosure Pillars: Content and Objectives

Pillars	Typical Disclosure Content (as defined by NZ CS 1)	Disclosure objective
Governance	Description of board and management roles in overseeing and managing climate-related risks and opportunities; integration into governance structures and processes	To enable primary users to understand both the role an entity's governance body plays in overseeing climate-related risks and climate-related opportunities, and the role management plays in assessing and managing those climate-related risks and opportunities (para. 6).
Strategy	Identification of climate-related risks and opportunities; their effects on business model and value chain; strategy resilience using scenario analysis	To enable primary users to understand how climate change is currently impacting an entity and how it may do so in the future (para. 10).
Risk Management	Processes for identifying, assessing, and managing climate-related risks; integration into overall risk management systems; escalation and decision thresholds	To enable primary users to understand how an entity's climate-related risks are identified, assessed, and managed and how those processes are integrated into existing risk management processes (para. 17).
Metrics and Targets	Disclosure of Scope 1, 2, and 3 emissions; financial metrics such as internal carbon prices; climate-related targets and progress indicators aligned to the strategy	To enable primary users to understand how an entity measures and manages its climate-related risks and opportunities. Metrics and targets also provide a basis upon which primary users can compare entities within a sector or industry (para. 20).

Source: XRB (2022b).

As shown in Table 2.1, each pillar focuses on a different aspect of climate-related reporting. Governance disclosure focuses on responsibility and oversight. Strategy disclosure links climate-related matters to the entity's business model and future positioning. Risk management disclosure explains the processes used to identify and manage climate-related risks. Metrics and targets disclosure translates climate-related matters into measures, targets, and performance information. This four-pillar structure provides the basis for developing the thematic framework used in RQ2.

2.5.3 Uneven Thematic Coverage in Climate Disclosure

NZ CS 1 requires CREs to disclose climate-related risks and opportunities within the four-pillar structure discussed in Section 2.5.2 (XRB, 2022b). However, the use of a common framework does not mean that climate-related disclosure content will be distributed evenly across these areas.

Prior climate disclosure research shows that disclosure levels often differ across thematic areas. Auzepy *et al.* (2023) analysed 3,335 reports issued between 2010 and 2021 by 188 banks that formally supported the TCFD recommendations. Their findings showed significant differences across TCFD themes. Specifically, banks disclosed less information on climate-related physical risks, scenario models, fossil-fuel exposure, and climate-linked remuneration than on broader strategy or emissions-related items. Chua *et al.* (2022), drawing on the Australian Accounting Standards Board's TCFD implementation dialogue and evidence from ASX 50 reporting, also noted uneven implementation. Their discussion highlighted variation in the use of scenario analysis, the timeframes adopted, the explanation of financial impacts, and the link between climate risks and strategy.

In summary, these studies show that TCFD-aligned reporting frameworks may provide a common structure, but actual thematic coverage can still differ across topics, sectors, and reporting contexts. Therefore, RQ2 examines the thematic coverage in the 2024 climate statements issued by CREs, with 2024 representing the first full mandatory reporting period. The objective is to identify the most prevalent climate-related themes and assess how CREs translated the NZ CS 1 reporting framework into actual disclosure content.

2.5.4 Thematic Content in the New Zealand Setting

In New Zealand, empirical research on the thematic content of climate-related disclosure remains limited. Ehalaiye *et al.* (2025) examined voluntary TCFD-aligned disclosures by six New Zealand container ports between 2017 and 2021. Their study found that disclosures across the TCFD thematic areas were uneven. Governance was the most disclosed area, while risk management, metrics and emission reduction targets were less extensively disclosed. Their study suggests that even when New Zealand entities use the TCFD framework, actual thematic coverage may vary. However, the study focuses on a small number of local government-owned ports before the full implementation of mandatory climate disclosure. Its evidence cannot explain the mandatory disclosure practices of CREs under NZ CS 1–3.

At present, little is known about how New Zealand firms disclosed climate-related information under NZ CS 1–3 during the first full mandatory reporting period. This is an important gap because mandatory reporting

changed the reporting environment. Firms no longer relied only on voluntary climate disclosure practices, but were required to prepare climate-related disclosures in accordance with the Aotearoa New Zealand Climate Standards (XRB, 2022a). Examining thematic content in this context can reveal which parts of the NZ CS 1 framework were most prevalent in early mandatory reporting. This leads to the next research question:

RQ2: What are the prevailing themes within climate-related disclosures by New Zealand CREs during the first full mandatory reporting period (2024)?

2.6 Readability of Climate-related Disclosure

2.6.1 Readability as a Disclosure Attribute

The purpose of climate-related disclosure is to provide useful information to investors and other primary users. However, an increase in disclosure extent or coverage of the required themes does not necessarily mean that disclosures are easier for users to understand or use. Prior accounting research has shown that lengthy, complex, or difficult-to-understand narrative disclosures can increase users' information-processing costs and reduce the usability of reported information (Bloomfield, 2002; Lehavy *et al.*, 2011; Li, 2008; Loughran & McDonald, 2014).

Climate reporting often requires firms to explain complex and forward-looking matters, including climate-related risks and opportunities, scenario analysis, and transition planning (XRB, 2022b; TCFD, 2017). These topics may require technical terminology or detailed explanations, which may require users to process longer, more technically demanding texts. Even when climate-related disclosures cover the necessary areas, the report's understandability and usefulness may be limited if its content is difficult to read. In this sense, the readability of climate-related disclosure is as important as disclosure extent and thematic content.

The importance of readability is also reflected in the New Zealand Climate Standards. NZ CS 3 requires climate-related disclosures to be presented to primary users in a clear, concise, understandable, and coherent manner (XRB, 2022d). This indicates that, within New Zealand's regulatory framework, the presentation of information is an important factor in determining whether climate-related information is decision-useful. Even if climate-related disclosures meet the relevant requirements, they may still fail to meet the understandability principle emphasised in NZ CS 3 if the text is overly complex or difficult to read.

Based on this, the thesis treats readability as an observable dimension of climate-related disclosure presentation. In this study, readability refers to the linguistic difficulty of climate-related disclosure text. It primarily reflects how textual features, such as sentence structure, word length, and vocabulary familiarity, affect users' reading burden (Li, 2008; Loughran & McDonald, 2014). Prior research has treated readability as an important attribute of corporate narrative disclosure because users often rely

on written explanations to understand financial performance, risk, corporate governance, and other non-financial matters (Lehavy *et al.*, 2011; Li, 2008). Importantly, readability does not directly measure users' actual understanding. Rather, it serves as a proxy for textual complexity and linguistic processing difficulty (Li, 2008; Loughran & McDonald, 2014; Redish, 2000).

This thesis uses two established readability measures: the Coleman-Liau Index (CLI) and the Dale-Chall Readability Score (DCRS). Prior accounting and sustainability reporting research has used these measures to quantify textual difficulty (Coleman & Liau, 1975; Dale & Chall, 1948; Nilipour *et al.*, 2020; Pombinho *et al.*, 2024). The Coleman-Liau Index focuses on character-based word length and sentence structure, while the Dale-Chall Readability Score combines sentence length with the proportion of words that do not appear on a list of easy words (Coleman & Liau, 1975; Dale & Chall, 1948). Both measures are useful in this study because climate-related disclosure may be difficult to read due to complex sentence structures and specialised vocabulary.

2.6.2 Mandatory Climate-related Disclosure and Readability

When climate-related disclosure moves from voluntary practice to mandatory reporting, its expected effect on readability is not straightforward. One view is that mandatory reporting may support more readable disclosure by reducing the fragmented and selective communication often associated with voluntary reporting. Leuz and Wysocki (2016) note that disclosure regulation can constrain managerial discretion and improve the comparability of reported information. In climate reporting, NZ CS 1 organises climate-related disclosures around four thematic areas based on the TCFD framework (XRB, 2022b; TCFD, 2017). As mentioned before, NZ CS 3 further requires climate-related disclosures to follow presentation principles such as understandability and coherence. More specifically, understandability requires that information be presented clearly and concisely, while coherence requires that disclosures explain the context and relationships between climate-related information and other disclosures (XRB, 2022d). However, these requirements do not guarantee readable text. Rather, they impose regulatory pressure on firms to organise and communicate climate-related information more clearly. This view is also consistent with readability research, which suggests that plain-English features, such as clear language, fewer hidden verbs, less legalistic wording, and lower unnecessary complexity, can reduce users' comprehension burden (Bonsall *et al.*, 2017). From this perspective, mandatory climate reporting may improve readability by enabling firms to translate the structure and presentation principles of climate reporting standards into clearer disclosure narratives.

However, evidence from studies on mandatory financial reporting suggests that standardisation does not necessarily improve report readability. In New Zealand, Richards and van Staden (2015) found that adopting IFRS reduced the readability of annual reports. Their findings suggest that even where standards are intended to improve the usefulness of reporting, technically demanding requirements can increase both the extent and complexity of narrative disclosures. Ebaid (2023) reached a similar conclusion in an emerging market setting, finding that IFRS adoption was associated with a decline in the readability of annual reports. Although these studies examine financial reporting rather than climate-related disclosure, they offer insight into how

readability may change when reporting moves from voluntary to mandatory. When new standards require firms to explain more technical information, greater standardisation may come with more complex text and a heavier reading burden. This possibility is related to the New Zealand climate-reporting context, as NZ CS 1–3 introduced mandatory and more prescriptive disclosure requirements.

This concern is particularly relevant to non-financial and sustainability reporting, where narratives often cover broad, qualitative, and technically demanding matters. In a systematic review of sustainability-report readability research, Pombinho *et al.* (2024) identified low readability as a recurring issue. Du Toit (2017) similarly found that integrated reports remained difficult to read, despite their aim of providing a more comprehensive and systematic account of organisational value creation. Moving beyond studies that rely mainly on standard readability formulas, Smeuninx *et al.* (2020) examined linguistic features such as lexical density, syntactic structure, and passive voice. They found that sustainability reports can place substantial linguistic demands on readers. In New Zealand, Nilipour *et al.* (2020) also showed that the quantity of sustainability reporting increased over time, while readability improved only slightly and remained low. The evidence suggests that non-financial reporting may remain difficult to read, even when intended to improve communication with users. Although these studies do not focus on climate-related disclosure, they highlight the linguistic challenges of communicating complex non-financial information in narrative form. Climate-related disclosure faces a similar challenge, as firms must present this information in a way that external users can easily read.

Evidence on mandatory sustainability reporting also suggests that stringent non-financial reporting requirements may intensify this issue. Bakry *et al.* (2023) found that corporate social responsibility reports became less readable after the introduction of the second edition of Malaysia's Sustainability Reporting Guide (SRG 2.0). This finding suggests that more formal non-financial reporting requirements may reduce readability. Within New Zealand's climate reporting framework, NZ CS 3 explicitly emphasises understandable and coherent presentation (XRB, 2022d). At the same time, NZ CS 1 requires CREs to report on technically demanding matters, including scenario analysis, physical risks, transition risks, and greenhouse gas emissions (XRB, 2022a). These requirements may require more specialised terminology and more detailed explanations than voluntary climate-related disclosures. Thus, although the standards formally require clear communication, the technical nature of mandatory climate-related disclosure may make the text more difficult to read.

Overall, the existing literature presents competing expectations. Mandatory climate reporting may improve readability through a standardised structure and explicit presentation requirements. At the same time, existing evidence suggests that more formal reporting requirements may also result in disclosures that are longer, more specialised, and harder to read. In general, existing research has not yet addressed whether the readability of climate-related disclosure narratives changed during the early implementation of NZ CS 1–3. This leads to the following research question:

RQ3: How has the readability of climate-related reporting by New Zealand CREs changed following the implementation of NZ CS 1–3?

2.7 Theoretical Framework

The introduction of NZ CS 1–3 formally established expectations for climate-related disclosure by New Zealand CREs (XRB, 2022a). However, common requirements do not necessarily produce identical reporting practices, as organisations may respond differently to institutional requirements (Oliver, 1991). This thesis applies institutional theory and legitimacy theory to interpret variation observed following the implementation of climate-related disclosure. It examines patterns in disclosure extent, thematic content, and readability. The following subsections apply these theoretical perspectives to consider how organisations respond to mandatory climate-related disclosure requirements.

2.7.1 Institutional Theory

Institutional theory posits that organisational practices are influenced by the rules, norms, and shared expectations that develop within an organisational field. Organisations do not make reporting decisions in isolation. Regulators, standard setters, professional bodies, peer organisations, and consulting groups all influence understandings of what constitutes appropriate and credible practice (DiMaggio & Powell, 1983; Scott, 2014). This theoretical perspective has also been widely used in accounting research to explain how reporting practices are adopted and reshaped within particular social and regulatory contexts (Dillard *et al.*, 2004).

In New Zealand, climate-related disclosure has developed within a field shaped by legislation, standard setting, regulatory oversight, and professional practice. The Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021 amended the Financial Markets Conduct Act 2013 and inserted Part 7A, providing the legal basis for mandatory climate-related disclosure. Building on this legal foundation, NZ CS 1–3 set out the reporting requirements that must be followed when preparing climate statements (Financial Markets Conduct Act 2013; Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021; XRB, 2022a).

A core concept in institutional theory is institutional isomorphism. It refers to the tendency for organisations in the same field to become more similar under shared pressures (DiMaggio & Powell, 1983). DiMaggio and Powell identify three mechanisms of isomorphism: coercive, mimetic, and normative isomorphism. Coercive isomorphism arises when organisations become more similar in response to external pressures. These pressures may be formal, such as laws, regulatory requirements, accounting standards, and mandatory disclosure regimes. They may also be informal, arising from social expectations, industry pressures, or demands from key stakeholders (DiMaggio & Powell, 1983). In the context of climate disclosure in New Zealand, NZ CS 1–3 and the statutory climate reporting regime are prime examples of coercive pressure because CREs are required to disclose climate-related information in accordance with regulations (XRB, 2022a). These requirements may encourage CREs to adopt similar reporting structures, terminology, and baseline disclosures. However, these requirements do not mandate that every entity provide the same narrative or the same level of detail.

Mimetic isomorphism typically arises in settings characterised by high uncertainty. When organisations are unsure of the most appropriate course of action, they may imitate practices of other organisations perceived as

more successful, legitimate, or mature (DiMaggio & Powell, 1983). During the early implementation of mandatory climate disclosure, CREs may be uncertain about how to present information on governance, strategy, risk management, or metrics and targets. Consequently, they may refer to peers, industry leaders, templates from professional bodies, or examples from early climate statements.

Normative isomorphism arises from professionalisation. Professionals within organisations are exposed to similar education, professional training, industry standards, professional associations, assurance practices, and consulting advice. Over time, this can lead them to adopt similar language, procedures, and disclosure methods (DiMaggio & Powell, 1983). In climate disclosure, XRB guidance, assurance practices, and consultants may exert normative pressure on CREs to adopt similar climate disclosure terminology, reporting structures, and technical language. Prior research has also linked regulatory and normative institutional factors to variation in climate risk disclosure practices (Panfilo & Krasodomska, 2022).

However, institutional pressures do not necessarily produce identical organisational responses. Oliver (1991) argues that organisations may respond strategically to institutional requirements through acquiescence, compromise, avoidance, defiance, or attempts to influence them. Overall, institutional theory offers a perspective for examining how formal requirements, uncertainty, and professional practice influence organisational responses to climate-related disclosure. The next section will explore legitimacy theory as a complementary perspective on public climate-related disclosure.

2.7.2 Legitimacy Theory

Institutional theory primarily explains how organisations respond to a common reporting environment, while legitimacy theory focuses more directly on how external audiences assess organisational actions. Dowling and Pfeffer (1975) define legitimacy as the congruence between the social values implied by organisational activities and socially accepted norms of behaviour. Similarly, Suchman (1995) defines legitimacy as a generalised perception that an organisation's actions are desirable, proper, or appropriate within a socially constructed system of norms, values, and beliefs. Thus, legitimacy theory considers whether organisational behaviour and external communication are perceived to align with social and regulatory expectations.

Environmental accounting research treats disclosure as a key channel through which organisations respond to external evaluation. Deegan (2002) argues that social and environmental disclosure can be used to demonstrate alignment with broader social expectations. O'Donovan (2002) likewise suggests that environmental disclosure may provide a means for organisations to address legitimacy pressures. Cho and Patten (2007) also describe environmental disclosure as a potential tool for legitimacy. Brown and Deegan (1998) further found that environmental disclosure patterns change with the level of media attention. These studies indicate that environmental disclosure serves not only an informational role but also a communicative role directed towards public evaluation. Climate-related disclosure may play a similar role, as it demonstrates how organisations identify, manage, and respond to climate-related risks and opportunities.

Legitimacy research also distinguishes between substantive and symbolic responses. Substantive responses usually involve changes to organisational policies, processes, or practices. Symbolic responses rely more on

public statements and visible arrangements that demonstrate conformity with established expectations (Ashforth & Gibbs, 1990). At the same time, corporate narratives may also be used for impression management. Managers can choose which information to disclose and how to organise and present it, potentially influencing external users' understanding of organisational activities and performance (Brennan *et al.*, 2009; Neu *et al.*, 1998). However, this study employs this distinction only as a theoretical perspective for interpreting differences in disclosure. Disclosure extent, thematic emphasis, and readability alone cannot establish whether firms have made substantive changes or demonstrate that managers intentionally engage in impression management.

This thesis uses legitimacy theory to interpret the public communication and external evaluation functions of climate-related disclosure following the implementation of NZ CS 1–3. It helps explain why CREs may present their climate-related actions, risks, and responses differently when climate-related information attracts greater social and regulatory attention. The combination of institutional theory and legitimacy theory provides a framework for explaining common reporting practices and variation in the ways CREs communicate climate-related information.

2.8 Research Gap and Study Positioning

New Zealand provides an important setting for research on mandatory climate-related reporting. It is one of the earliest jurisdictions to introduce a comprehensive climate reporting regime. NZ CS 1–3 replaced the previously largely voluntary reporting environment with statutory requirements (XRB, 2022a). This shift allows researchers to observe how public reporting changes when climate-related disclosure becomes a legal obligation. It also provides early evidence of how formal reporting standards are translated into reporting practice.

Some studies have already examined the effects of NZ CS 1–3. However, these studies vary in their objectives, the types of evidence used, and their research designs. Walton *et al.* (2024) used interviews with 20 reporting organisations, including corporate issuers and financial-sector entities, to examine firms' experiences during the early implementation phase. Holley and Cathro (2026) studied organisational change and market responses to mandatory climate reporting. They combined an event study of 33 NZX-listed CREs with interviews with reporting entities and institutional investors. Gehricke *et al.* (2025) assessed the regime using survey evidence, an LLM-based disclosure-compliance measure, and fund-holding analysis. Priyan and Bandara (2025) examined the relationship between climate reporting scores and financial performance for 26 NZ listed companies. In a conference paper, Abeysekara *et al.* (2025) used London Stock Exchange Group (LSEG) data for 30 New Zealand-listed companies to compare disclosure levels before and after implementation. The FMA (2024) provided regulatory observations from the first climate statements prepared by 70 CREs. Together, these studies provide useful early evidence on implementation, compliance, and organisational or market consequences. However, the literature remains fragmented and provides only a partial account of CRE reporting practice under NZ CS 1–3.

This thesis addresses this issue through three interrelated levels of analysis. The first level examines disclosure extent. It identifies whether the amount of climate-related reporting changed during the transition to mandatory reporting. However, extent alone cannot show what entities chose to report. The second level examines the main themes in the first full mandatory reporting cycle. It identifies the climate-related matters that entities addressed and emphasised. The third level concerns presentation. The disclosure extent and thematic content do not indicate whether users can easily read the narrative information. The readability analysis examines how climate-related information was presented during the early implementation. This is particularly important because NZ CS 3 requires disclosures to be easily understandable and coherent (XRB, 2022d). Overall, these research questions provide complementary perspectives on reporting practices within the same regulatory framework.

This thesis makes three contributions to research on mandatory climate-related reporting. First, it examines whether the extent of climate-related disclosure by New Zealand CREs changed following the implementation of NZ CS 1–3. It provides evidence on how disclosure practices developed as climate reporting moved from a voluntary to a mandatory setting. Second, the study examines the thematic composition of climate-related disclosures during the first full mandatory reporting cycle. This helps to identify the climate-related themes that CREs emphasised under the new reporting regime. Third, it investigates whether the readability of climate-related reporting by New Zealand CREs changed after the implementation of NZ CS 1–3. Overall, the thesis provides evidence on how CRE reporting developed following the implementation of NZ CS 1–3 and may inform regulators, standard setters, and preparers assessing the operation of the new regime.

Chapter 3: Research Design

3.1 Research Methodology

This thesis adopts a mixed-methods research design to examine the climate-related disclosure practices under New Zealand's mandatory climate reporting regime. Mixed methods refer to the combination and integration of quantitative and qualitative methods within a single study (Bryman, 2006; Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 2010). This is because climate reporting is largely narrative in form and may be dispersed across different reports (Christensen *et al.*, 2021). In addition to analysing the extent of climate disclosures, this study also aims to examine the more specific content of those disclosures. As a result, a single method is unlikely to fully capture these features or differences, or to address the research questions of this thesis (Ilhan *et al.*, 2023). The methodological logic follows the pragmatist principle in mixed methods research. In contrast to traditional paradigms that privilege a single philosophical stance, pragmatism is problem-centred. It treats method choice as being driven by what best answers the research questions and produces useful insights (Creswell & Plano Clark, 2011; Johnson & Onwuegbuzie, 2004; Morgan, 2007).

Empirically, this thesis examines climate reporting outcomes by distinguishing three related but conceptually distinct dimensions: the extent of climate-related disclosure (RQ1), the thematic content of disclosure (RQ2), and the readability of the presented disclosure narratives (RQ3). Taken together, these three dimensions provide a more complete account of reporting practices by capturing disclosure volume, substance, and presentation. The research design comprises three empirical components aligned with RQ1-RQ3, including computational text analysis, thematic analysis, and statistical modelling. The three empirical components are connected through a common body of climate-related disclosure data, which is analysed differently for each research question. Therefore, the design serves an expansion purpose by using different methods to address distinct aspects of the overall research problem (Greene *et al.*, 1989; Schoonenboom & Johnson, 2017). The following sections will outline the data sources and the detailed design of the research questions.

3.2 Data and Sample Construction

This study constructs its sample from the full population of New Zealand climate reporting entities (CREs) and the corpus of reports in which they publicly disclosed climate-related information during 2021–2024. The starting point for sample identification was the Climate-related Disclosures Register dashboard of the New Zealand Companies Office, which was used to identify all climate reporting entities listed as at 15 November 2025 (New Zealand Companies Office, n.d.). These entities were selected because they fall within Part 7A of the Financial Markets Conduct Act 2013, which provides the legal basis for mandatory climate-related disclosure in New Zealand (Financial Markets Conduct Act 2013).

A continuing challenge in climate disclosure research is that climate-related information is not confined to a single document type. Firms may spread climate-related content across multiple

investor-facing communications (Hahn *et al.*, 2015). Under Aotearoa New Zealand Climate Standard 3 (NZ CS 3), climate-related disclosures may be presented either in a standalone climate statement or within another document, provided that the required disclosures are clearly identified and meet the relevant standard requirements (XRB, 2022d). Accordingly, the report collection scope was not limited to standalone climate statements, but also included annual reports (including annual reviews), sustainability reports, ESG reports, GHG reports, and integrated reports. Documents were retrieved manually from three main sources: the entity's own website, NZX for listed issuers, and the Melville Jessup Weaver industry data pages for insurers and KiwiSaver providers (NZX, n.d.; Melville Jessup Weaver, n.d.-a, n.d.-b).

This study retained only documents that actually contained climate-related information. After manual inspection, publicly available documents that contained no climate-related disclosure, such as standalone financial statements, Modern Slavery Statements, or Gender Pay Reports, were excluded. This rule is important because climate-related information is often dispersed across lengthy corporate documents and multiple reporting channels. Large-sample accounting research has made a similar methodological point. Corporate narrative disclosures are lengthy and complex, and are rarely concentrated in a single standardised location. Careful retrieval, screening, and cleaning are therefore necessary parts of valid text analysis (Dyer *et al.*, 2017; El-Haj *et al.*, 2020; Lang & Stice-Lawrence, 2015).

In this study, an entity was retained in the final sample only if it met all three of the following conditions. First, it had to fall within the population of climate reporting entities defined under Part 7A of the Financial Markets Conduct Act 2013. Second, climate-related disclosures prepared under the New Zealand reporting framework were required to be publicly available during the study period. These disclosures could be presented as standalone climate statements or integrated into other reports, provided they satisfied the requirements of NZ CS 3 (XRB, 2022d; Financial Markets Conduct Act 2013). Third, the entity had to have the data required for the 2021–2024 observation period. Entities affected by exemption-related notices, as well as entities for which the required reports or financial data were unavailable at the time of collection, were excluded from the final sample.

Table 3.1

Sample Selection of Climate Reporting Entities

	Number of CREs
CREs identified from the Climate-related Disclosures Register	174
Less: entities affected by exemption-related or cancelled status	(30)
Less: entities not meeting the disclosure-data availability requirements for 2021–2024	(49)
Final Sample	95

Note. This table presents the entity-level selection process from the population identified through the Climate-related Disclosures Register as at 15 November 2025. The entity recorded as cancelled was also marked as exempt. A further 49 entities were excluded because they did not meet the disclosure-data availability requirements for the 2021–2024 observation period. The resulting sample of 95 CREs serves as the disclosure sample for RQ1 and RQ2 and as the initial sample for the subsequent RQ3 sample selection.

Although most New Zealand-listed companies began disclosing climate-related information before 2021, many insurers and investment schemes still lack available data. To enable more meaningful analysis and comparison, this study therefore focuses on the more stable 2021–2024 period, for which data are more readily available. This period helps ensure sufficient report availability and comparability across the CRE population, thereby supporting more consistent firm-year analysis. After the screening process, the final database comprised 95 CREs and 667 reports. The retained report categories include annual reports (including annual reviews), climate statements (including standalone climate-related disclosures), sustainability reports, ESG reports, GHG reports, and integrated reports. Table 3.2 shows the distribution of these reports by year and report type.

Table 3.2

Distribution of Reports by Year and Report Type

Year	Total Reports	Annual Reports	Climate Statements	Sustainability Reports	Integrated Reports	ESG Report	GHG Report
2021	132	112	3	11	3	1	2
2022	147	113	7	15	3	2	7
2023	172	113	28	17	3	2	9
2024	216	112	73	16	3	1	11
Total	667	450	111	59	12	6	29

Note. Table 3.2 presents the year-by-year distribution of all reports retained in the final disclosure corpus, disaggregated by report type. Report observations are defined at the document level. Annual reports include annual reviews, and climate statements include independent climate-related disclosures. The horizontal line separates the pre-mandatory reporting period (2021–2022) from the early mandatory reporting period (2023–2024). NZ CS 1–3 apply to annual reporting periods beginning on or after 1 January 2023 (XRB, 2022a).

To support traceability and later analysis, each report was stored using a consistent naming rule based on entity name, reporting period, and report type, and organised within a multi-level folder structure supported by an Excel tracking file. The tracking file records entity name, industry classification, report type, number of reports, and report title. This structured documentation improves data traceability and facilitates both computational and manual analysis, particularly where disclosure evidence is dispersed across different reporting formats (El-Haj *et al.*, 2020). Based on the classification logic of the Global Industry Classification Standard (GICS) and information available on NZX, the 95 climate reporting entities were further grouped into 10 industries. GICS is a globally standardised hierarchical industry classification system that assigns each company to a single

category according to its principal business activity (MSCI, 2024). Overall, the resulting sample provides a transparent and reproducible basis for the empirical analyses. Table 3.3 reports the industry distribution of CREs in the final sample.

Table 3.3

Industry Distribution of Climate Reporting Entities in the Final Sample

Industry	Number of CREs	%
Financial Services	23	24.21
Communication Services	4	4.21
Consumer Goods	16	16.84
Health Care	10	10.53
Industrials	8	8.42
Information Technology	5	5.26
Public Services	2	2.11
Real Estate	9	9.47
Transportation	9	9.47
Utilities & Energy	9	9.47
Total	95	100.00%

Note. Table 3.3 presents the industry composition of the final sample at the entity level. Percentages are calculated based on the 95 CREs included in the final sample. Due to rounding, the percentages may not sum to exactly 100%.

3.3 Measuring Climate-Related Disclosure Extent

Having defined the analytical sample, this section explains how RQ1 measures the extent of climate-related disclosure. Research Question 1 asks:

What is the extent of climate-related disclosure by New Zealand CREs before and after the introduction of NZ CS 1–3?

In this study, disclosure extent refers to the volume of climate-related narrative information disclosed by CREs in publicly available corporate reports within a given reporting period. The analysis covers the period from 2021 to 2024, which provides a stable window for comparison around the implementation of New Zealand's mandatory climate-related disclosure regime. Given that Aotearoa New Zealand Climate Standard 1 (NZ CS 1) applies to accounting periods beginning on or after 1 January 2023, this timeframe also enables a comparison between the pre- and post-mandatory disclosure periods (XRB, 2022b).

Accordingly, RQ1 does not simply assess whether climate issues are disclosed in a binary sense. Instead, it focuses on the extent of climate-related disclosure. It further examines how the extent of this disclosure varies

across report types and industries, and whether these patterns change following the introduction of New Zealand's mandatory climate disclosure regime.

RQ1 employs computational text analysis to examine the extent of climate-related disclosure. Computational text analysis refers to the application of natural language processing (NLP) and related computer-assisted procedures to textual data for automated information extraction or measurement (Bochkay *et al.*, 2023). In accounting and finance research, computational text analysis is commonly used to convert large volumes of narrative disclosures into reproducible quantitative measures. This approach has been widely adopted in literature and has become increasingly important as researchers address lengthy and less-structured corporate reports (El-Haj *et al.*, 2020; Li, 2011; Loughran & McDonald, 2016). In addition, this method has been increasingly applied in sustainability reporting research, where relevant information is typically embedded in narrative disclosures rather than presented in a single structured dataset (Baier *et al.*, 2020; Lin *et al.*, 2024; Maibaum *et al.*, 2024).

For multi-topic reports, this study employs a keyword-matching text extraction approach to identify climate-related narratives in corporate reports. In the accounting text analysis literature, keyword search is used to identify or extract information relevant to the research question, after which variables can be constructed from the extracted text for further analysis (Bochkay *et al.*, 2023).

Following Ding *et al.* (2023), RQ1 uses six specific terms to determine whether the initial text corpus contains climate-related information: “climate change,” “climate risk(s),” “climate opportunit(y/ies),” “carbon emission(s),” “GHG emission(s),” and “greenhouse gas(es).” Matching is implemented in a case-insensitive manner and allows simple singular and plural variants of these terms. These terms are selected because they are most directly associated with “climate,” rather than broader environmental, social, or sustainability-related language. Such a focused design is important for conceptual precision (Bochkay *et al.*, 2023). At the RQ1 stage, the objective is to identify a clearly defined climate-related disclosure corpus to measure the extent of reporting.

To account for differences in report scope, the climate-related corpus was constructed using a document-type-specific inclusion rule. Sentence-level keyword matching was applied to multi-topic corporate reports, including annual reports (and annual reviews), sustainability or CSR reports, ESG reports, and integrated reports. These reports contain substantial material unrelated to climate-related disclosure. Therefore, only sentences containing at least one of the pre-specified climate terms were retained. By contrast, standalone climate statements and GHG reports were treated as climate-focused documents. Once these reports met the collection and manual-screening criteria described in Section 3.2, their full cleaned text was retained in the climate-related corpus without further keyword filtering. This approach reduced the risk of excluding relevant climate-related information from documents specifically prepared to communicate climate-related or emissions-related matters, while preventing non-climate content in broader corporate reports from inflating the disclosure extent measure.

For multi-topic reports, RQ1 applies sentence-level keyword matching, rather than counting keywords at the document level. In content analysis, the recording unit is the basic unit of text used for identification and counting. Prior methodological research shows that quantitative results are sensitive to this choice, and that the selected unit should align with the construct being measured (Milne & Adler, 1999; Unerman, 2000; Vourvachis & Woodward, 2015). Following Kim *et al.* (2023), this study uses sentences as the extraction unit. The algorithm identifies keywords only within sentence boundaries and extracts the complete sentence in which the keyword appears. If more than one keyword appears in the same sentence, that sentence is extracted only once and counted once in the climate-related corpus. This design preserves minimal semantic context while avoiding distortions that may arise when isolated words, headings, or table entries are treated as substantive disclosures (Bochkay *et al.*, 2023; Maibaum *et al.*, 2024). Kim *et al.* (2023) also compared algorithmic extraction with manual collection, finding that the algorithm achieved an accuracy of over 97.7%. Their validation evidence further supports the accuracy of automated sentence-level keyword matching in identifying climate-related disclosures.

Overall, the procedure begins with cleaning all manually collected reports that contain climate-related information. The text extracted from these PDF reports is standardised and filtered to remove structural or non-substantive content, such as URLs, headings, table of contents lines, figure captions, and similar elements. This pre-processing step is necessary because publicly available corporate reports are typically provided in heterogeneous PDF formats, while reliable text analysis depends on structured extraction and cleaning procedures (El-Haj *et al.*, 2020). After this cleaning stage, a text analysis algorithm scans the cleaned text of multi-topic reports for the six pre-specified climate-related keywords. Once any of these keywords are detected, the algorithm automatically extracts the sentence or sentences in which the keyword appears and stores the results at the document level. This procedure allows the study to identify a clearly defined climate-related text corpus in a transparent and replicable way. After extraction, all matched climate-related sentences are first aggregated within each report, and the total number of words in the extracted text is calculated. Where a firm-year contains more than one retained report, the report-level counts are then summed across all reports issued by the same entity in the same reporting year to derive the firm-year disclosure extent measure. This design preserves report-level variation for descriptive analysis by report type, while also producing a consistent firm-year measure for cross-firm and cross-year comparison and for linkage with the firm-year analysis in RQ3.

The word count of the retained climate-related text serves as the primary measure for RQ1. This measure is preferable to total report length, which includes substantial non-climate-related content (Bochkay *et al.*, 2023). It is also preferable to raw keyword frequency, as repeated brief mentions may inflate counts without adding meaningful narrative substance. By contrast, counting the words within matched climate-related sentences better reflects the actual extent of narrative disclosure, while maintaining transparency and replicability in the measurement process (Ding *et al.*, 2023; Kim *et al.*, 2023; Moreno & Caminero, 2022).

Overall, this design provides a transparent and reproducible approach to measuring the extent of climate-related disclosure across a large set of publicly available corporate reports.

3.4 Identifying Thematic Coverage in Climate-Related Disclosure

After RQ1 identifies the extent of climate-related disclosure, RQ2 examines the thematic content of climate-related disclosures for the 2024 reporting year. Research Question 2 asks:

What are the prevailing themes within climate-related disclosures by New Zealand CREs during the first full mandatory reporting period (2024)?

Therefore, the purpose of RQ2 is to identify which disclosure themes were most commonly present in climate-related disclosures in 2024.

The data used for RQ2 are limited to the 2024 reporting year. This year was selected because it was the first full mandatory reporting period for CREs under NZ CS 1–3 (XRB, 2022a; FMA, 2024). NZ CS 1–3 apply to accounting periods beginning on or after 1 January 2023. However, CREs have different balance dates and lodge climate statements after the reporting periods (Companies Office, n.d.). Accordingly, 2024 provides a more complete picture of CREs' first full mandatory reporting cycle. Focusing on 2024 provides a consistent regulatory framework for analysing CRE disclosures. RQ2 uses the 2024 subset of the climate-related corpus constructed for RQ1. This corpus contains keyword-matched sentences from multi-topic reports and the full cleaned text of standalone climate statements and GHG reports. The same report-type-specific inclusion rules therefore determine the material available for thematic coding. This approach ensures that the analysis remains focused on climate-related disclosure and improves comparability across different entities and report types (Bochkay *et al.*, 2023; Krippendorff, 2018).

RQ2 employs a framework-based thematic content analysis approach. Thematic analysis is typically defined as a method for identifying, analysing, and reporting patterns or themes within data (Braun & Clarke, 2006; Clarke & Braun, 2016). In this study, the approach is framework-based, as the analysis is conducted within the NZ CS 1 disclosure framework. Framework-based qualitative analysis allows existing conceptual or regulatory frameworks to guide the organisation of data, while still allowing more specific themes to be developed through close reading of the material (Fereday & Muir-Cochrane, 2006; Gale *et al.*, 2013; Hsieh & Shannon, 2005). This approach is appropriate for RQ2 because the study does not examine climate disclosure in an open-ended setting. It examines climate disclosure within a specific regulatory framework, in which NZ CS 1 already defines the disclosure content that CREs are expected to cover (XRB, 2022b).

The coding procedure was informed by Braun and Clarke's (2006) thematic analysis process. Coding was undertaken by a single coder. First, NZ CS 1 and the 2024 climate-related disclosure corpus were read to become familiar with both regulatory requirements and disclosure texts. This step helped clarify the climate-related information that CREs are required to disclose and what was actually

disclosed in 2024. Second, while reading each report, text segments corresponding to climate-related disclosure matters covered by NZ CS 1 were coded. Initial codes were named according to the specific content of the text, such as “emissions intensity”, “scenario implications”, “governance reporting routines”, and “internal emissions price”.

Third, after completing the initial coding, the detailed codes were reviewed and compared across reports. This step checked whether similar disclosures had been coded consistently and whether closely related codes should be combined. Fourth, related codes were grouped into broader reporting themes. This grouping was guided by NZ CS 1 and by the way CREs organised climate-related information in their own reports. To check consistency, randomly selected excerpts within the same theme were reviewed. The coding was checked again after themes were merged. Fifth, the reporting themes were finalised and named to provide a clear hierarchical structure for presenting the research findings. This process produced 12 reporting themes, which were categorised under the four disclosure pillars (thematic areas) of NZ CS 1: governance, strategy, risk management, and metrics and targets. These four pillars were adopted because NZ CS 1 structures its disclosure objectives and requirements around these areas (XRB, 2022b).

Table 3.4 summarises the final theme-level coding framework by linking each reporting theme to its corresponding NZ CS 1 disclosure pillar.

Table 3.4

RQ2 Thematic Framework for Climate-Related Disclosure

Disclosure pillar	Theme (12)	Explanation
Governance	Governance oversight	Disclosures about the governance body's oversight of climate-related risks and opportunities, including its responsibilities, climate-related capability, and reporting routines.
	Management's role	Disclosures about how climate-related responsibilities are assigned to management and enacted through management roles, organisational structures, and decision-making routines.
	Accountability and incentives	Disclosures linking climate-related governance to strategy oversight, target oversight, performance accountability, or remuneration arrangements.
Strategy	Climate impacts and exposure	Disclosures about current or anticipated physical and transition impacts, financial effects, time horizons, and the entity's exposure across operations, assets, sectors, or value chains.
	Scenario analysis and resilience	Disclosures about scenario assumptions, resilience assessment, and the implications of scenario analysis for the business model, strategy, or planning decisions.
	Transition planning	Disclosures about the transition plan aspects of strategy, including strategic change, implementation steps, and alignment with capital deployment or funding decisions.
Risk Management	Risk identification and assessment	Disclosures about the tools, methods, criteria, time horizons, frequency, and prioritisation processes used to identify and assess climate-related risks.
	Risk integration	Disclosures about how climate-related risk processes are integrated into enterprise risk management, escalation pathways, and value-chain coverage or exclusions.

	Risk response and review	Disclosures about actions, controls, monitoring, and reassessment processes used to manage and review identified climate-related risks.
Metrics and Targets	GHG emissions and reporting basis	Disclosures about Scope 1, 2, and 3 emissions, emissions intensity, measurement methods, assumptions, exclusions, and assurance over greenhouse gas information.
	Climate risk and opportunity metrics	Disclosures about non-emissions metrics used to measure climate-related risks and opportunities, including transition risk, physical risk, capital deployment, internal emissions pricing, or other KPIs.
	Targets and performance	Disclosures about target design, base years, timeframes, progress against targets, 1.5°C alignment, and the use of offsets.

Note. Table 3.4 reports the final theme-level framework used to present the RQ2 findings. More detailed coding notes were used during the coding process to clarify coding boundaries, but they are not retained as a separate reporting level because RQ2 focuses on prevailing reporting themes.

Themes were measured using document-level thematic coverage. A document was counted once under a theme when at least one relevant text segment in that document was coded to that theme. This measure was selected because the coding unit was not fixed at the sentence level. Depending on how information was presented, relevant disclosure may appear in a sentence, a paragraph, a table entry, or a note. For this reason, counting documents is a more effective measure of thematic visibility across different report formats than counting coding references (Krippendorff, 2018). Accordingly, document-level coverage reflects the visibility of a theme across the corpus, rather than the depth or quality of disclosure in an individual report.

3.5 Assessing the Readability of Climate-Related Disclosure

Having examined the extent of climate-related disclosure in RQ1 and the themes of disclosure in RQ2, RQ3 turns to the readability of climate-related reporting. The research design for Research Question 3 is organised around the following question:

> *How has the readability of climate-related reporting by New Zealand Climate Reporting Entities (CREs) changed following the implementation of NZ CS 1–3?*

This section explains the research method used for RQ3. It first presents the model specification, then outlines the sample and variable definitions.

3.5.1 Model Specifications

To examine the readability of climate-related disclosure following the mandatory reporting period under NZ CS 1–3, this study first estimates the baseline model, as specified in equation (1):

$$Readability_{it} = \beta_0 + \beta_1 Policy_t + \beta_2 E_Score_{it} + \beta_3 Size_{it} + \beta_4 ROA_{it} + \beta_5 LEV_{it} + \beta_6 Env_Sens_i + \varepsilon_{it} \quad (1)$$

where $Readability_{it}$ is measured alternatively by the Coleman-Liau Index (CLI) and the Dale-Chall Readability Score (DCRS) for firm i in year t. $Policy_t$ is a period indicator variable equal to 1 for observations in 2023–2024, when NZ CS 1–3 was in effect; and 0 for observations in 2021–2022,

before the standards became applicable. E_Score_{it} is the firm-year environmental pillar score obtained from LSEG. $Size_{it}$, ROA_{it}, and LEV_{it} are firm-year control variables, and Env_Sens_i is a time-invariant industry indicator for environmentally sensitive sectors (see Section 3.5.2). Variable definitions are provided in Appendix A.

To provide supplementary evidence on whether the readability of climate-related disclosure following the mandatory reporting period under NZ CS 1–3 varies with CREs' environmental performance, this study also estimates the interaction model, as specified in equation (2):

$$Readability_{it} = \beta_0 + \beta_1 Policy_t + \beta_2 E_Score_{it} + \beta_3 (E_Score_{it} \times Policy_t) + \beta_4 Size_{it} + \beta_5 ROA_{it} + \beta_6 LEV_{it} + \beta_7 Env_{Sens_i} + \varepsilon_{it} \quad (2)$$

where $Readability_{it}$ is measured alternatively by the Coleman-Liau Index (CLI) and the Dale-Chall Readability Score (DCRS) for firm i in year t. $Policy_t$ is a period indicator variable equal to 1 for observations in 2023–2024, when NZ CS 1–3 was in effect; and 0 for observations in 2021–2022, before the standards became applicable. E_Score_{it} is the Refinitiv environmental pillar score. $E_Score_{it} \times Policy_t$ captures whether the association between environmental performance and readability changes during the NZ CS 1–3 policy period relative to the pre-policy period. $Size_{it}$, ROA_{it}, and LEV_{it} are firm-year control variables, and Env_Sens_i is a time-invariant industry indicator for environmentally sensitive sectors (see Section 3.5.2). Variable definitions are provided in Appendix A.

Both equations are estimated at the firm-year level using random-effects (RE) and firm fixed-effects (FE) estimators. Estimator choice is assessed using the Hausman specification test, which examines whether differences between the RE and FE estimates are systematic (Hausman, 1978). As reported in Appendix C, none of the tests rejects the null hypothesis. These test outcomes support the use of RE as the main estimator. Although RE is the main estimator, the FE estimates are also reported for comparison. This alternative specification absorbs time-invariant firm characteristics and relies on within-firm changes over time (Wooldridge, 2010). Because *Env_Sens* does not vary within firms over the sample period, it is not estimated in the FE models. Tables 4.6–4.9 present the regression results using conventional, non-clustered standard errors. Repeated observations of the same firm may have correlated errors over time (Petersen, 2009). Appendix D therefore examines the sensitivity of statistical inference to within-firm dependence using firm-clustered standard errors (Cameron & Miller, 2015). The model specifications and sample are unchanged.

3.5.2 Measurement of Readability and Model Variables

To address RQ3, the regression models examine the readability of the climate-related disclosure corpus at the firm-year level. Policy captures the difference in readability between the pre-policy period (2021–2022) and the early mandatory-reporting period (2023–2024), after accounting for firm

size, profitability, leverage, and environmental sensitivity. Detailed variable definitions are provided in Appendix A.

Within RQ3, readability is examined as a disclosure attribute that captures the linguistic difficulty or ease of climate-related narrative reporting (Chen & Tseng, 2021; Loughran & Mcdonald, 2014). For example, Li (2008) treats annual report readability as a measurable disclosure attribute and argues that it provides a new empirical measure of disclosure quality. These studies established readability as an empirical construct in accounting research rather than a purely impressionistic judgement. In this thesis, readability refers specifically to the textual difficulty of the climate-related disclosure corpus extracted through the RQ1 procedure.

In prior accounting and sustainability-reporting research, readability has most commonly been operationalised using formula-based indices. The formula-based indices provide a replicable way to convert narrative disclosure text into quantitative variables for analysis (Efretuei & Hussainey, 2023; Gosselin *et al.*, 2021). However, prior research does not treat readability as dependent on a single formula. Instead, accounting and sustainability-reporting studies commonly select one or more established readability indices according to the disclosure setting and the textual features most relevant to the analysis (Nilipour *et al.*, 2020; Pombinho *et al.*, 2024; Smeuninx *et al.*, 2020).

Following this approach, this study measures readability using two formula-based indices: the Coleman-Liau Index (CLI) and the Dale-Chall Readability Score (DCRS). The choice of these two measures is guided by the linguistic properties of the climate-related disclosure corpus analysed in this thesis. Climate-related disclosures are mostly narrative in form and often use terms that need to be explained or defined for users (XRB, 2022d). A suitable measurement design should capture not only structural features of text, but also variation in lexical difficulty. CLI and DCRS are analytically useful in this respect because they measure different dimensions of textual difficulty. CLI focuses on character-based word length and sentence structure, whereas DCRS combines sentence length with an easy-word criterion. Using both measures allows the analysis to examine whether changes in readability are reflected mainly in general textual structure, in difficult words or in both dimensions (Coleman & Liau, 1975; Dale & Chall, 1948).

The selection of CLI and DCRS is also supported by prior accounting-related and sustainability-reporting research. In financial and accounting disclosure settings, the Coleman–Liau Index has been used alongside other readability measures to examine the readability of audit and risk-related narrative disclosures (Hussin *et al.*, 2023; Jia & Li, 2022). CLI has also been applied to CSR and sustainability disclosures, including New Zealand and Australian sustainability-reporting settings (Li *et al.*, 2022; Nazari *et al.*, 2017; Nilipour *et al.*, 2020).

The Dale–Chall Readability Score has a similar basis in accounting and sustainability-related readability research. Earlier accounting studies used Dale–Chall to examine the readability of financial statement notes and accounting-related information (Smith & Smith, 1971; Worthington, 1977). More recent sustainability and integrated-reporting studies also use Dale–Chall to assess the accessibility of non-financial corporate disclosures (du Toit, 2017; Phang *et al.*, 2022; Pombinho *et al.*, 2024).

The first readability measure is the Coleman-Liau Index (CLI). Coleman and Liau (1975) developed this formula for machine scoring. This index uses letters and sentences as its main inputs and produces a score that corresponds approximately to a U.S. grade level (Coleman & Liau, 1975; Gómez & Lafuente, 2019). More specifically, CLI estimates readability based on the average number of letters and the average number of sentences per 100 words. Following Coleman and Liau (1975), this study calculates the Coleman-Liau Index using equation (3):

$$CLI_{it} = 0.0588L_{it} - 0.296S_{it} - 15.8 \quad (3)$$

where CLI_{it} is the Coleman–Liau Index for firm i in year t, L_{it} is the average number of letters per 100 words in the climate-related disclosure text, and S_{it} is the average number of sentences per 100 words.

To illustrate the calculation of the Coleman–Liau Index, suppose that a climate-related disclosure contains 200 words, 10 sentences, and 900 letters. In this example, L_t the average number of letters per 100 words, equals $\left(\frac{900\ letters}{200\ words}\right) \times 100 = 450$, while S_t , the average number of sentences per 100 words, equals $\left(\frac{10\ sentences}{200\ words}\right) \times 100 = 5$. Substituting these values into Equation (3) gives:

$$CLI = 0.0588(450) - 0.296(5) - 15.8 = 9.18$$

This illustrative score is provided only to demonstrate the calculation procedure and does not represent an observation from the study sample.

CLI is interpreted as an inverse readability measure. In an accounting-narrative setting, Gutiérrez-Ponce *et al.* (2023) use the Coleman–Liau Index to assess the readability of accounting disclosures and classify the index as follows: scores of 5 and below indicate very easy-to-read text; 6 indicates easy-to-read text; 7 indicates fairly easy-to-read text; 8–12 indicates fairly difficult-to-read text; 13–16 indicates difficult-to-read text; and 17 and above indicates extremely difficult-to-read text. Consistent with this interpretation, higher CLI values in this study indicate greater reading difficulty and lower readability (Coleman & Liau, 1975; Nilipour *et al.*, 2020).

The second readability measure is the Dale-Chall Readability Score (DCRS). Unlike CLI, DCRS incorporates a lexical-familiarity component. More specifically, it combines average sentence length with the proportion of difficult words, where difficult words are defined by reference to the Dale-Chall easy-word list. In commonly used reference descriptions of the Dale-Chall method, the easy-word list is described as containing 3,000 easy words, and words outside that list are treated as difficult for the formula (Dale & Chall, 1948). This feature is important in the present study. Climate-related disclosure may become difficult not only because of sentence structure, but also because it contains specialised or technical vocabulary. Dale and Chall (1948) explain that the resulting score can be converted into corrected grade levels, which provide a more usable interpretation of reading difficulty. For adult readers, these corrected grade levels may be interpreted as the number of years of schooling required to read the material with ease and understanding (DuBay, 2007). Following Dale and Chall (1948), this study calculates the Dale-Chall Readability Score using equation (4):

$$DCRS_{it} = \begin{cases} 0.1579\left(\frac{difficult_{it}}{words_{it}} * 100\right) + 0.0496\left(\frac{words_{it}}{sentences_{it}}\right) + 3.6365 \\ \quad , if \left(\frac{difficult_{it}}{words_{it}}\right) > 5\% \\ 0.1579\left(\frac{difficult_{it}}{words_{it}} * 100\right) + 0.0496\left(\frac{words_{it}}{sentences_{it}}\right) \\ \quad , if \left(\frac{difficult_{it}}{words_{it}}\right) \leq 5\% \end{cases} \quad (4)$$

where $DCRS_{it}$ is the Dale–Chall Readability Score for firm i in year t, difficult words$_{it}$ is the number of words that do not appear in the Dale–Chall familiar-word list, words$_{it}$ is the total number of words, and sentences$_{it}$ is the total number of sentences in the climate-related disclosure text for firm i in year t.

Dale–Chall scores are interpreted using corrected grade levels. Dale and Chall (1948) provide a correction table that links formula scores to approximate school-grade reading levels. Table 3.5 presents the Dale–Chall corrected grade-level scale.

Table 3.5

Dale–Chall Corrected Grade-Level Scale

Formula Raw Score	Corrected Grade Levels
4.9 and below	Grade 4 and below
5.0 to 5.9	Grades 5–6
6.0 to 6.9	Grades 7–8

7.0 to 7.9	Grades 9–10
8.0 to 8.9	Grades 11–12
9.0 to 9.9	Grades 13–15, or college level
10.0 and above	Grade 16 and above, or college-graduate level

Note. Table 3.5 shows scores of 10.0 and above fall within the highest corrected grade-level category. DCRS values in this range are therefore interpreted as indicating college-graduate-level or higher reading difficulty, rather than a precise year-by-year estimate of schooling.

In this study, higher DCRS values indicate greater reading difficulty and lower readability. The corrected grade-level scale in Table 3.5 provides the basis for interpreting the empirical results.

Policy is an indicator variable equal to 1 for firm-year observations in 2023–2024 and 0 for firm-year observations in 2021–2022. It captures the early mandatory reporting period following the adoption of NZ CS 1–3. In the regression, *Policy* is included to examine whether the readability of climate-related disclosure differs between the pre-mandatory period and the early mandatory reporting period, after accounting for firm-level controls.

Based on prior literature, the models specified in equations (1) and (2) include *E_Score*, *Size*, *ROA*, *LEV*, and *Env_Sens* as firm-level control variables. These variables help ensure that the *Policy* coefficient captures differences in readability during the policy period, rather than variation attributable to observable firm characteristics.

E_Score is the firm-year environmental pillar score obtained from LSEG (formerly Refinitiv). LSEG constructs its ESG score from publicly reported ESG information. The environmental pillar is based on publicly available ESG information and covers resource use, emissions, and innovation. The score is industry-weighted and normalised on a 0–100 scale. A higher *E_Score* indicates stronger relative environmental performance within the LSEG framework (LSEG, n.d.; LSEG, 2024). *E_Score* is included as a firm-level control variable to account for observable differences in firms' environmental reporting characteristics. It is interpreted as a comparable LSEG-based proxy rather than as a direct measure of a firm's actual environmental impact (Benuzzi et al., 2025; Dobrick et al., 2023).

Size, firm size, is measured as the end-of-year total assets. It is included to account for differences in firm scale that may be relevant to the readability of climate-related disclosures. Prior textual-disclosure research similarly controls for firm size because larger firms tend to have more complex information environments and reporting practices that can influence narrative disclosure outcomes (Barth *et al.*, 2025; Lehavy *et al.*, 2011). Therefore, controlling for Size allows the comparison between reporting periods to account for this observable firm characteristic. Total assets are entered without a logarithmic transformation, consistent with the measurement used by Azzam et al. (2020) in a sustainability disclosure setting. This specification adjusts for absolute differences in asset scale

rather than proportional differences between firms. It assumes a linear association between total assets and readability, conditional on the other explanatory variables.

ROA, profitability, is measured as pre-tax Return on Assets, a ratio-based indicator that scales operating performance by the firm's asset base. ROA is included because prior sustainability and disclosure studies commonly examine profitability as a firm characteristic that may be associated with reporting practices (Hewagama & Dassanayake, 2022; Islam & Van Staden, 2025). For example, Welbeck *et al.* (2017) argue that providing environmental information is costly, and firms are more willing/able to bear these costs when profitability is stronger. In readability research, profitability is associated with the readability properties of annual report narratives, and managers may respond to performance incentives by altering disclosure complexity (Lo *et al.*, 2017). Therefore, controlling for ROA allows the comparison between reporting periods to account for differences in firm profitability.

LEV, leverage, is measured as the ratio of total debt to total assets (a "debt-to-assets" ratio). It is included as a control variable because leverage captures a firm's financing structure and creditor-related monitoring pressure, both of which may be associated with disclosure behaviour. From an agency perspective, firms with higher debt levels may provide more information to reduce agency conflicts between managers, shareholders and debt holders (Jensen & Meckling, 1976). Therefore, this study includes leverage as a firm-level control variable, consistent with prior disclosure research that controls for differences in firms' capital structure (Gutiérrez-Ponce *et al.*, 2023; Islam & Van Staden, 2025).

Env_Sens, environmental sensitivity, is a binary variable coded 1 if a firm operates in an environmentally sensitive or high-profile industry, and 0 otherwise. This classification is based on prior environmental disclosure literature, which generally treats industries with greater direct environmental impacts and stronger stakeholder, regulatory, and legitimacy pressures as environmentally sensitive (Reverte, 2009; Roberts, 1992). In the New Zealand setting, Nilipour *et al.* (2020) also incorporate environmental sensitivity into their analysis of sustainability report readability, supporting the relevance of this classification to narrative disclosure outcomes. Consistent with this literature and with the industry structure of the present sample, Env_Sens is coded as 1 for firms in Utilities & Energy, Transportation, and Industrials, as these sectors are more likely to generate substantial environmental impacts and to face stronger pressure to provide environmental and sustainability-related disclosures (Nilipour *et al.*, 2020; Hewagama & Dassanayake, 2022). Firms in all other industries are coded 0. Env_Sens is included to control for industry-level differences in disclosure pressure that may also affect the readability of climate-related disclosure.

3.5.3 RQ3 Analysis Sample

This subsection focuses solely on the data collection steps unique to RQ3. The broader document collection process and the construction of the climate-related disclosure corpus have already been explained in the earlier Section 3.2.

The starting point for RQ3 is not the full text of annual reports or sustainability reports in their raw PDF form. Instead, the analysis is based directly on the climate-related disclosure text identified through the RQ1 extraction procedure. This aggregation approach aligns with RQ3, which examines the readability of climate-related disclosures rather than the full reporting package. This is because broader reporting documents, such as annual reports, often contain financial, governance, operational, and other non-climate information that falls outside the scope of this research question. Using the RQ1 climate-related corpus provides a closer conceptual fit between the research question and the text analysed. This approach is also consistent with prior broader New Zealand sustainability reporting literature. For example, Nilipour *et al.* (2020) manually extracted sustainability reporting text and then applied readability software to it, rather than treating the full annual report as the object of analysis.

Consistent with report-level readability measurement in sustainability-report research (e.g., Uddin & Chakraborty, 2022), readability is first calculated separately for the extracted climate-related text in each report using the Coleman-Liau Index (CLI) and the Dale-Chall Readability Score (DCRS). When a firm-year contains more than one report with retained climate-related disclosure text, the firm-year readability measure is calculated as the arithmetic mean of the report-level readability scores. For example, where a firm-year includes both an annual report with climate-related disclosure and a standalone climate statement, CLI and DCRS are first calculated separately for each report. The report-level scores are then averaged to produce one readability score for each firm-year. Thus, each firm-year contributes one readability observation to the regression analysis, regardless of whether the climate-related disclosure text is drawn from one report or multiple reports. Therefore, each report receives equal weight, regardless of the amount of climate-related text it contains. The resulting measure represents average report-level readability, rather than the readability of all climate-related text combined into a single document. The choice is consistent with the general principle that weighting and aggregation should reflect the intended meaning of a summary measure (Greco et al., 2019). However, it does not establish that equal weighting is superior to word-count weighting or that all report types are equally important to readers.

E_Score was collected from LSEG. The accounting-based variables, *Size*, *ROA*, and *LEV*, were also collected from LSEG where available. However, because the New Zealand climate reporting entity population is not limited to listed firms, complete accounting data were not available from LSEG for

all firm-year observations. For those missing cases, the relevant financial data were hand-collected from firms' financial statements and, where necessary, the variables were calculated directly from the reported statement data. *Env_Sens* was assigned from each firm's industry classification.

After the climate-related readability measures were merged with the firm-year explanatory and control variables, the regression dataset was screened for missing values. A substantial part of the missing data arose because the New Zealand CRE population includes non-listed entities for which complete firm-year data were not available from LSEG. Firm-year observations with any missing data on the variables used in the model were excluded from the final regression sample.

Table 3.6 details the RQ3 sample. Panel A presents the sample selection process for the 2021–2024 period. The initial sample comprises 95 firms and 380 firm-year observations. After excluding observations with missing data for the regression variables, the final sample comprises 47 firms and 178 firm-year observations. Panel B presents the year distribution of the final sample. The observations are distributed relatively evenly across the four years, with 43 firm-year observations in both 2021 and 2022, and 46 firm-year observations in both 2023 and 2024.

The retained sample is also heavily tilted towards listed entities. 96% of the final firm-year observations are listed. This pattern mainly reflects data availability rather than a substantive sampling choice, as complete firm-year financial and ESG data are much more readily available for listed CREs than for non-listed entities. As a result, the RQ3 regressions speak most directly to the readability of climate-related disclosure among the data-available, largely listed segment of New Zealand CREs. The findings are less informative for smaller and non-listed CREs, which are more likely to be excluded because of missing data.

Table 3.6

Overall RQ3 Sample

Panel A: Sample selection		
	Firms	Firm-year
Observations	95	380
Excluded due to missing data	(48)	(202)
Sample	47	178
Panel B: Year distribution of final sample		
Year	Firm-year	%
2021	43	24.16
2022	43	24.16
2023	46	25.84
2024	46	25.84
Sample	178	100%

Note. Table 3.6 presents a reconciliation of the RQ3 sample from the initial dataset to the final regression sample. It also presents the year distribution of the final sample. Firm-year observations are defined at the entity-year level.

3.6 Chapter Summary

This chapter has described the research design used in this thesis. It explained how the sample was constructed and how each research question was examined through analyses of disclosure extent, themes, and readability. The next chapter reports the findings for the three research questions.

Chapter 4: Findings

4.1 Changes in Climate-related Disclosure Extent

RQ1 examines how the extent of climate-related disclosure by New Zealand CREs changed around the introduction of NZ CS 1–3. The analysis is based on 95 CREs and 380 firm-year observations from 2021 to 2024, covering two years before the mandatory climate reporting standards became applicable and two years in the early mandatory reporting period.

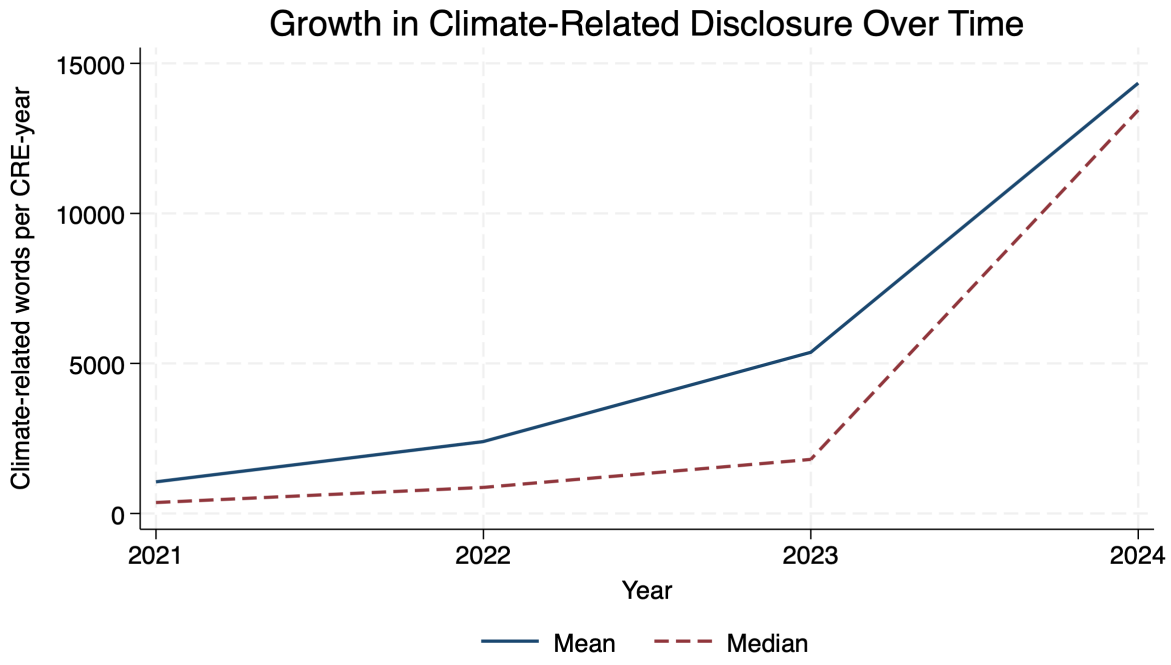
The extent of disclosure is measured as the number of words in climate-related disclosure extracted through sentence-level keyword matching, as explained in Section 3.3. The analysis is conducted at the firm-year level because climate-related information may appear across several report types within the same reporting year. This section reports the extent of climate-related disclosure between 2021 and 2024, its distribution across report types, and variation across industries. These results provide the empirical basis for examining changes in climate-related reporting practices during the early implementation of NZ CS 1–3.

4.1.1 Trends in Climate-related Disclosure Extent

Figure 1 plots the annual mean and median values of climate-related disclosure extent from 2021 to 2024.

Figure 1

Growth in the Extent of Climate-Related Disclosure Over Time



Note. The figure reports the mean and median number of climate-related words per firm-year. Sentence-level keyword matching is applied to multi-topic reports, while the full cleaned text of standalone climate statements and GHG reports is retained. The sample comprises 380 firm-year observations across 95 CREs for the period 2021–2024.

Figure 1 shows a clear increase in the extent of climate-related disclosure over the sample period. Both the mean and median values exhibit a consistent upward trend from 2021 to 2024. The increase is relatively modest between 2021 and 2022, becomes more pronounced between 2022 and 2023, and is most substantial between 2023 and 2024. This strengthening upward trend, particularly the sharper increase observed in 2024, may reflect the transition from the pre-application period during which climate reporting was not mandatory, to the early phase of compulsory reporting under NZ CS 1–3.

In addition, the figure also shows a persistent gap between the median and the mean, particularly in 2023. This suggests that part of the increase in disclosure extent may have been concentrated among a small number of CREs with unusually long climate-related disclosures. However, the sharp rise in the median in 2024 indicates that higher levels of climate-related disclosure have become more common across the sample.

Table 4.1

Descriptive Statistics for Climate-Related Disclosure Extent

Year	Observations	Total words	Mean	Median	SD	Min	Max
2021	95	100,177	1,054	365	1,746	0	8,703
2022	95	227,760	2,397	869	5,259	0	38,821
2023	95	510,351	5,372	1,803	7,445	0	32,566
2024	95	1,362,425	14,341	13,440	9,498	1,369	40,826

Note. The table is based on 95 CREs and 380 firm-year observations from 2021 to 2024. The extent of disclosure is measured as the word count of retained climate-related text. Sentence-level keyword matching is applied to multi-topic reports, while the full cleaned text of standalone climate statements and GHG reports is retained. SD refers to standard deviation.

Table 4.1 reports descriptive statistics for the extent of climate-related disclosure from 2021 to 2024. The results show a substantial increase in disclosure extent over the sample period. The total number of words in climate-related disclosures increased from 100,177 in 2021 to 1,362,425 in 2024, representing a net increase of 1,262,248 words. The 2024 total was approximately 13.6 times the 2021 level.

As the number of observations remained constant across years, this trend is also reflected in the mean word count. The mean increased from 1,054 words per firm-year in 2021 to 14,341 words in 2024. The largest annual increase occurred between 2023 and 2024, when the total number of words in climate-related disclosures rose by 852,074 words, from 510,351 to 1,362,425. In 2024, the total number of climate-related words exceeded the combined total for the previous three years. This result is consistent with prior evidence from mandatory non-financial reporting settings. Ottenstein *et al.* (2021) report increased non-financial disclosure following

the introduction of mandatory reporting requirements in Europe. Papa *et al.* (2022) also find that mandatory non-financial reporting regulation is associated with more extensive environmental disclosure.

The median provides further insight into how this increase was distributed across CREs. From 2021 to 2023, the mean was substantially higher than the median. For example, in 2023, when the gap was largest, the mean was 5,372 words, while the median was 1,803 words. This pattern, together with the relatively large standard deviation of 7,445, indicates a right-skewed distribution in the earlier years, where part of the increase was driven by CREs with more extensive climate-related disclosure.

This pattern changed in 2024. The median increased sharply to 13,440 words and moved much closer to the mean of 14,341 words. This pattern, together with the increase in the minimum value to 1,369 words, indicates that the expansion of climate-related disclosure in 2024 was not limited to a small number of high-disclosure CREs but became more common across the sample.

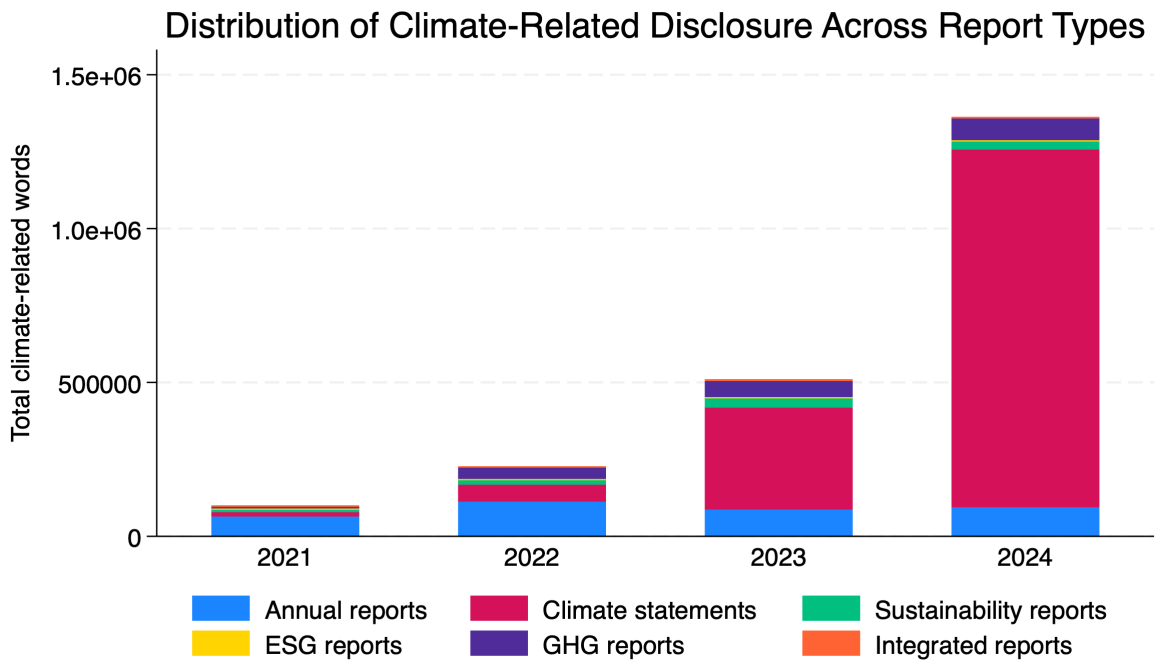
Overall, the descriptive statistics show a substantial increase in the extent of climate-related disclosure. Although disclosure was less evenly distributed between 2021 and 2023, the 2024 results indicate a broader increase in climate-related reporting across the sample after the implementation of NZ CS 1–3.

4.1.2 Disclosure Extent Across Report Types

The increase in the extent of disclosure also raises a question about the reporting form. NZ CS 3 permits climate-related disclosures to be presented either in a standalone climate statement or within another document, provided that the required disclosures are clearly identifiable (XRB, 2022d). The report-type analysis separates disclosure embedded in existing corporate reports from disclosure provided through standalone climate statements. Figure 2 and Table 4.2 present the distribution of climate-related disclosure across report types.

Figure 2

Distribution of Climate-Related Disclosure Across Report Types



Note. The figure reports the total number of climate-related words by report type and year. Report types are annual reports, climate statements, sustainability reports, ESG reports, GHG reports, and integrated reports. The sample comprises 380 firm-year observations across 95 CREs for the period 2021–2024.

Figure 2 illustrates how the increase in disclosure extent was distributed across report types. In 2021 and 2022, the overall volume of disclosure remained relatively limited and was located mainly in annual reports, with smaller contributions from sustainability reports, GHG reports, and early climate statements. This pattern began to change in 2023 and became much clearer in 2024. By 2024, climate statements accounted for the largest share of climate-related disclosure, while annual reports became a secondary reporting vehicle. This shift suggests that the early mandatory reporting period was associated not only with a larger volume of climate-related disclosure, but also with a reorganisation of disclosure into standalone climate statements.

Table 4.2

Climate-Related Disclosure by Report Type

Report type	2021	2022	2023	2024
Panel A: Number of CREs by report type				
Annual reports	88	88	88	88
Climate statements	3	7	27	75
Sustainability reports	11	14	17	15
ESG reports	1	2	2	1
GHG reports	2	7	9	11

Integrated reports	3	3	3	3
Panel B: Climate-related words by report type				
Annual reports	64,466	112,761	87,049	94,462
Climate statements	14,329	55,327	330,951	1,162,741
Sustainability reports	11,823	17,768	33,313	26,500
ESG reports	70	731	1,299	3,616
GHG reports	5,186	36,466	51,931	71,282
Integrated reports	4,303	4,707	5,808	3,824

Note. The sample comprises 380 firm-year observations across 95 CREs for the period 2021–2024. Panel A reports the number of CREs by report type and year. Panel B reports total climate-related words by report type and year. Sentence-level keyword matching is applied to multi-topic reports, while the full cleaned text of standalone climate statements and GHG reports is retained.

Table 4.2 presents the distribution of climate-related disclosure across report types in the sample. Panel A shows that annual reports remained the most commonly used report type for climate-related information across the sample, with 88 firm-year observations in each year. However, the use of standalone climate statements increased substantially over time. Only three firm-year observations contained standalone climate statements in 2021, followed by seven in 2022, 27 in 2023, and 75 in 2024. Other report types were used less frequently. Sustainability reports appeared in 11 to 17 firm-year observations across the period, while ESG reports, GHG reports, and integrated reports were comparatively limited. This trend indicates a clear change in the report type for climate-related disclosure after the implementation of NZ CS 1–3.

Panel B shows a similar pattern when disclosure extent is measured by climate-related words. In 2021 and 2022, annual reports accounted for the largest share of climate-related words, at 64.4% (64,466 words) and 49.5% (112,761 words), respectively. This pattern changed after the implementation of NZ CS 1–3. Climate statements accounted for 64.9% of climate-related words in 2023 (330,951 words), increasing further to 85.3% in 2024 (1,162,741 words). By comparison, the share of climate-related words in annual reports declined from 17.1% in 2023 (87,049 words) to 6.9% in 2024 (94,462 words). These results indicate that climate-related disclosure became increasingly concentrated in standalone climate statements, rather than being embedded mainly in annual reports. Other report types containing climate-related disclosure also increased over time, but their contribution to the overall disclosure extent remained comparatively small. This finding is consistent with broader mandatory reporting literature, which suggests that regulation can affect not only the volume of non-financial disclosure but also how such information is structured and presented (Carmo & Ribeiro, 2022; Christensen *et al.*, 2021; García-Benau *et al.*, 2022).

Overall, the results show NZ CS 1–3 not only increase the extent of climate-related disclosure but also change the report types through which climate-related information was communicated. Before the mandatory regime was fully reflected in reporting practice, climate-related information was more often dispersed across annual reports and other sustainability-related documents. By 2024, standalone climate statements had become the main report type for climate-related disclosure, both in terms of the number of CREs using climate statements and the number of climate-related words disclosed through those statements.

4.1.3 Industry Variation in Disclosure Extent

Table 4.3 reports the extent of climate-related disclosure across the 10 industries represented in the 95-CRE sample.

Table 4.3

Climate-Related Disclosure by Industry

Industry	CREs	Mean 2021–2022	Mean 2023–2024	Median 2021–2022	Median 2023–2024
Financial Services	23	1,556	11,867	552	9,073
Communication Services	4	1,109	5,920	443	1,957
Consumer Goods	16	1,157	10,187	1,155	9,175
Health Care	10	2,280	7,754	276	4,257
Industrials	8	735	4,588	496	2,652
Information Technology	5	535	6,325	144	6,214
Public Services	2	6,659	11,400	6,741	13,262
Real Estate	9	501	7,204	218	4,580
Transportation	9	1,752	10,316	704	8,562
Utilities & Energy	9	4,478	16,713	2,064	15,681

Note. The 10 industry groups were constructed based on the classification logic of the Global Industry Classification Standard (GICS), supplemented with information from the NZX. Each CRE was assigned to an industry based on its primary business activities. Values represent climate-related words per firm-year. The 2021–2022 period precedes the mandatory application of NZ CS 1–3, while 2023–2024 captures the early mandatory reporting period.

Table 4.3 compares the extent of climate-related disclosure across industries before and after the application of NZ CS 1–3. The table reports the mean and median number of climate-related words for each industry in the pre-application period (2021–2022) and the early mandatory reporting period (2023–2024). Across all 10 industries in the sample, disclosure extent was greater in the mandatory reporting period than in the pre-application period of NZ CS 1–3. This pattern indicates that the expansion in disclosure extent was not confined to a single industry but was evident across the CRE sample.

The largest increases in mean word count were observed in Utilities & Energy, which increased from 4,478 words per firm-year in 2021–2022 to 16,713 words in 2023–2024, close to four times the pre-application level. Financial Services also recorded a substantial increase, from 1,556 to 11,867 words over the same period. This finding is consistent with prior carbon and climate disclosure research, which shows that disclosure practices vary across industries because firms face different levels of emissions exposure, environmental sensitivity, and stakeholder scrutiny (Choi *et al.*, 2013; Prado-Lorenzo *et al.*, 2009; Rankin *et al.*, 2011). Utilities and energy firms face direct emissions and transition risks, necessitating more detailed disclosures, while financial institutions must increasingly report on both their own exposures and those embedded in their portfolios.

Some industries with relatively low disclosure extent before NZ CS 1–3 became applicable also experienced substantial relative growth. For example, Real Estate increased from 501 to 7,204 words, around 14.4 times the pre-application level. Information Technology increased from 535 to 6,325 words, around 11.8 times the pre-application level. Although these industries did not become the highest-disclosing industries in absolute terms, their growth suggests that the mandatory regime broadened climate-related reporting beyond industries that had already disclosed more extensively.

The median results show a similar pattern to the mean results, with median disclosure increasing across all industries from 2021–2022 to 2023–2024. This suggests that the increase in disclosure extent was not limited to a small number of high-disclosing CREs but was also reflected in broader industry-level reporting patterns.

4.2 Thematic Coverage in the First Mandatory Reporting Cycle

The evidence from RQ1 showed a substantial increase in climate-related disclosures in 2024 and a growing focus on climate statements. RQ2 further examines the content of climate-related disclosures in 2024, the first full mandatory reporting cycle. The purpose is to identify how New Zealand CREs translated the four thematic areas in NZ CS 1 into actual reporting topics.

The analysis for RQ2 is based on climate-related text identified and extracted from 216 reports published by 95 CREs in 2024. These texts were coded in NVivo using a framework organised around the four NZ CS 1 disclosure areas, with more specific reporting themes within each area. The detailed extraction and coding procedures are described in Section 3.2. and Section 3.4

The main measure reported in this section is the number of documents coded under each theme. Each document is counted once under a theme if it contains at least one coded passage relevant to that theme. This means the measure reflects the prevalence of a theme in 2024 climate-related disclosures, rather than the length or depth of relevant discussion in each report.

4.2.1 Thematic Framework for 2024 Climate-related Disclosure

Figure 3

Coding Framework and Document-level Theme Coverage for 2024 Climate-Related Disclosure



Note. n indicates the number of 2024 report documents containing at least one coded passage under each pillar or theme. Counts are based on 216 reports from 95 CREs. A single report may be counted under more than one pillar or theme.

Figure 3 presents the thematic framework used to organise the results of the 2024 climate-related disclosure, along with the number of report documents in which each pillar and theme appeared. Climate-related disclosure is shown as the overarching analytical category, with the four NZ CS 1 disclosure pillars forming the second level and the 12 themes forming the outer level. The figure also indicates how widely each pillar and theme appeared across the 2024 climate-related disclosure corpus.

The figure also shows that coverage was not evenly distributed across the four pillars. *Strategy* was the most widely reported pillar (n = 178), indicating that most CREs disclosed information on how climate-related risks and opportunities affected their business models, strategies, transition planning, financial planning, or resilience (XRB, 2022b). *Metrics and Targets* was also highly visible (n = 170), reflecting the importance of measurable climate-related information, including emissions, metrics, targets, and performance-related disclosures (XRB, 2022b). *Governance* and *Risk Management* were less widely represented, with both appearing in 144 report documents. This suggests that oversight, accountability, and risk process disclosures

were present throughout much of the corpus, but their coverage was less extensive than that of the Strategy and Metrics and Targets pillars (XRB, 2022b).

Figure 3 provides theme-level evidence on the distribution of climate-related disclosure content in 2024. It shows which themes had wider document coverage under the NZ CS 1 framework, and which themes were less visible across the corpus. This evidence helps answer RQ2 by identifying the disclosure themes that were most commonly present during the first full mandatory reporting period. The next section examines the prevailing themes in more detail.

4.2.2 Prevailing and Less Widely Reported Themes

After presenting the overall thematic framework in Figure 3, this section examines the theme-level findings in greater detail. The focus is on the three themes that appeared most frequently in the 2024 corpus: *GHG emissions and reporting basis*, *Climate impacts and exposure*, and *Transition planning*. Together, these themes provide the primary evidence for identifying the prevailing themes during the first full mandatory reporting period. In addition, this section will briefly compare *Risk response and review*, the least frequently identified theme in the 2024 corpus.

At the document level, *GHG emissions and reporting basis* was the first prevailing theme, appearing in 165 of the 216 reports analysed for 2024 (76.4%). The dominance of this theme suggests that emissions disclosure had become the most visible component of climate-related disclosure in the 2024 reporting cycle. This theme captured disclosures that reported GHG emissions and explained how those emissions were measured, prepared or assured. Fisher & Paykel Healthcare's 2024 annual report provides an example of emissions disclosure being linked to operational change:

> "Scope 1 emissions have decreased slightly, while our Scope 2 emissions have continued to increase. This increase is as a result of more production occurring in Mexico and the establishment of our manufacturing facility in Guangzhou, China" (Fisher & Paykel Healthcare, 2024, p. 113).

Warehouse Group's 2024 Climate Statement also reflects another aspect of the same theme, where the disclosure focuses on the assurance basis for GHG emissions:

> "This assurance engagement was undertaken in line with the International Standard on Assurance Engagements (New Zealand) 3410: Assurance Engagements on Greenhouse Gas Statements, issued by the New Zealand Auditing and Assurance Standards Board" (The Warehouse Group, 2024, p. 25).

The two extracts show two ways in which *GHG emissions and reporting basis* appeared in the 2024 corpus. Fisher & Paykel Healthcare links movements in Scope 1 and Scope 2 emissions to operational changes, while The Warehouse Group identifies the assurance standard used for its greenhouse gas statement. As the most frequently disclosed theme, *GHG emissions and reporting basis* indicates that CREs widely reported Scope 1,

2, and 3 emissions, emissions intensity, measurement methods, assumptions, exclusions, and assurance over greenhouse gas information.

The next two most widely represented themes were both located within the Strategy pillar. *Climate impacts and exposure* was the second prevailing theme, appearing in 148 reports (68.5%). This theme captured disclosures about current or anticipated physical and transition impacts, financial effects, time horizons, and exposure across operations, assets, sectors, or value chains. For *Climate impacts and exposure*, a common disclosure form was to link physical climate events to operational or financial consequences. The AMP Investment Trust 2024 climate statement provides a clear example of this pathway:

> "Companies are at risk of financial losses due to the physical impacts of climate change from infrastructure damage and productivity disruptions caused by increasing climate change-influenced events like flooding, wildfires, and chronic heat waves. This can impact investors as destruction of properties and disruptions to operations decrease the value of investments" (AMP Wealth Management New Zealand Limited, 2024, p. 13).

The same theme also appeared through transition-related exposure, where climate performance was linked to investor expectations and access to finance. KMD Brands' 2024 climate statement illustrates this financial-market pathway:

> "Failure to meet defined sustainability targets and investor expectations which may result in a reduced share price and availability of finance" (KMD Brands, 2024, p. 12).

Climate impacts and exposure as the second prevailing theme indicates that CREs widely identified climate-related risks and/or explained the potential effects of these risks on the entity or its investors.

Transition planning was the third prevailing theme, appearing in 134 reports (62.0%). This theme captured disclosures about how CREs planned to respond to climate-related risks and opportunities. Meridian's 2024 climate-related disclosure gives a clear investment-oriented example:

> "We are currently on track to deliver our target of 7 in 7, which is our plan to have seven new large-scale renewable generation developments underway by 2030" (Meridian, 2024, p. 30).

T&G Global's 2024 climate statement illustrates transition planning by linking climate response with adaptation and product innovation:

> "JOLI™ branded apples are the result of over 10 years of innovation. It is proven to grow successfully across Aotearoa New Zealand and supports our transition to building increased climate resilience through diversification of growing regions, as well as varieties and brands" (T&G Global, 2024, p. 15).

Transition planning as the third prevailing theme indicates that CREs commonly disclosed transition plan aspects of strategy, including strategic change, implementation steps, and alignment with capital deployment or funding decisions.

Within the 12-theme framework, *Risk response and review* had the lowest document coverage, appearing in 64 reports (29.6%). This suggests that disclosures about the actions, controls, monitoring, and reassessment processes used to manage climate-related risks were less visible across the 2024 corpus than the prevailing themes identified above.

Overall, although NZ CS 1–3 provided a common mandatory framework and disclosure requirements for CREs, the findings show that the coverage of climate-related disclosure in 2024 was uneven. The most prevalent themes were *GHG emissions and reporting basis*, *Climate impacts and exposure*, and *Transition planning*, whereas *Risk response and review* appeared much less frequently. This pattern may indicate that CREs were more likely to disclose emissions data, identifiable risk exposures, and published transition plans in 2024. By contrast, disclosure was less visible where firms needed to provide more detailed explanations of internal risk responses, controls, monitoring, or reassessment.

The findings indicate that the first full mandatory reporting period produced an identifiable thematic structure, but disclosures were not evenly distributed across all climate-related reporting areas. Building on evidence that NZ CS 1–3 increased the extent of climate disclosure, the results for RQ2 indicate which themes of climate-related information were most commonly reported by CREs during the first full mandatory reporting period.

4.3 Readability During the Early Implementation Period

4.3.1 Descriptive Trends in Readability

Figures 4-7 plot the annual mean and median values of the Coleman-Liau Index (CLI) and the Dale-Chall Readability Score (DCRS) over the 2021–2024 period. The dashed vertical line marks 2023, the first year from which NZ CS 1–3 apply to accounting periods beginning on or after 1 January. Together, these figures provide a visual overview of how the readability of climate-related disclosures changed over time around the introduction of the mandatory climate reporting regime., , ,

Figure 4

Mean Coleman-Liau Index Around the Adoption of NZ CS 1–3 (2021–2024)

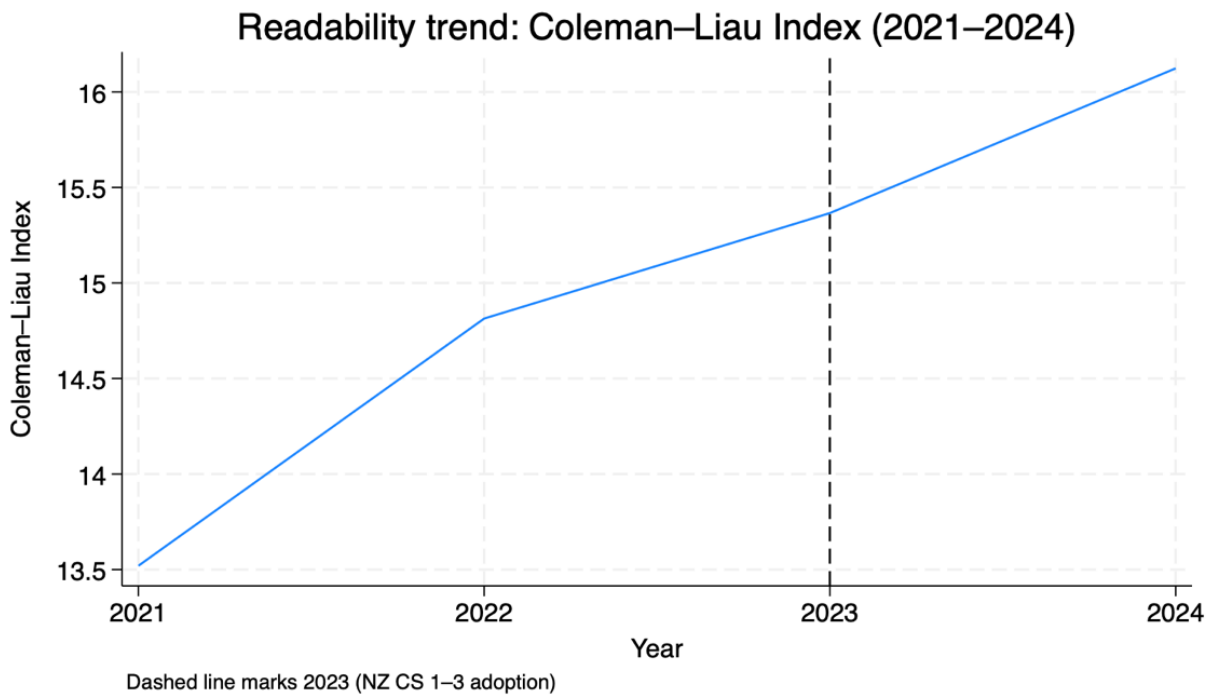


Figure 5

Mean Dale-Chall Readability Score Around the Adoption of NZ CS 1–3 (2021–2024)

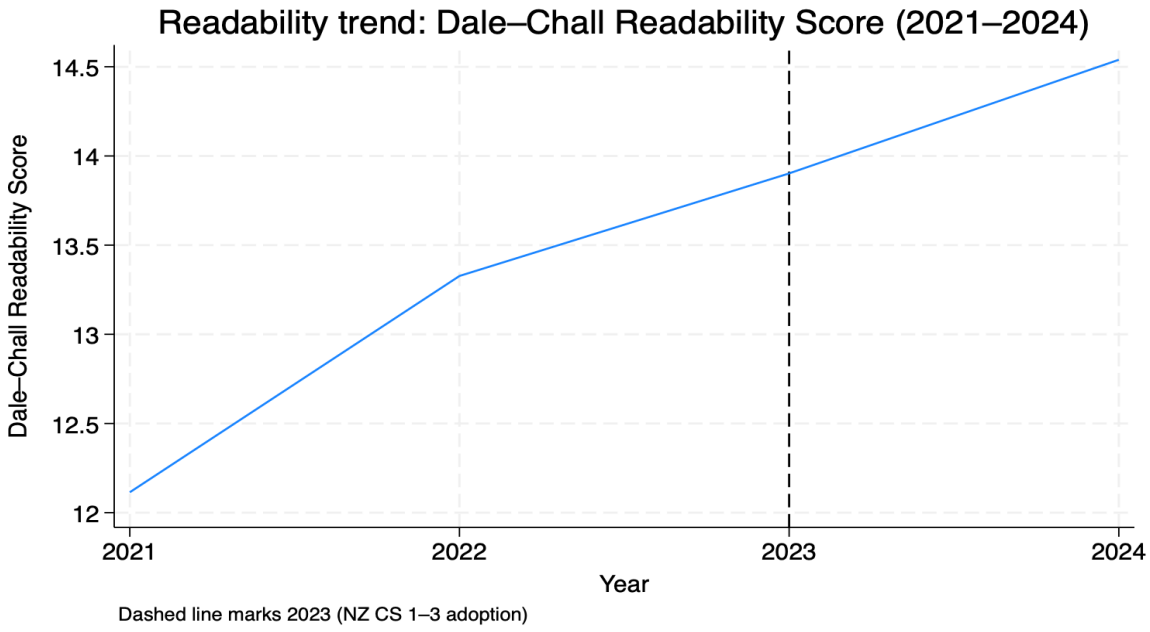


Figure 6

Median Coleman-Liau Index Around the Adoption of NZ CS 1–3 (2021–2024)

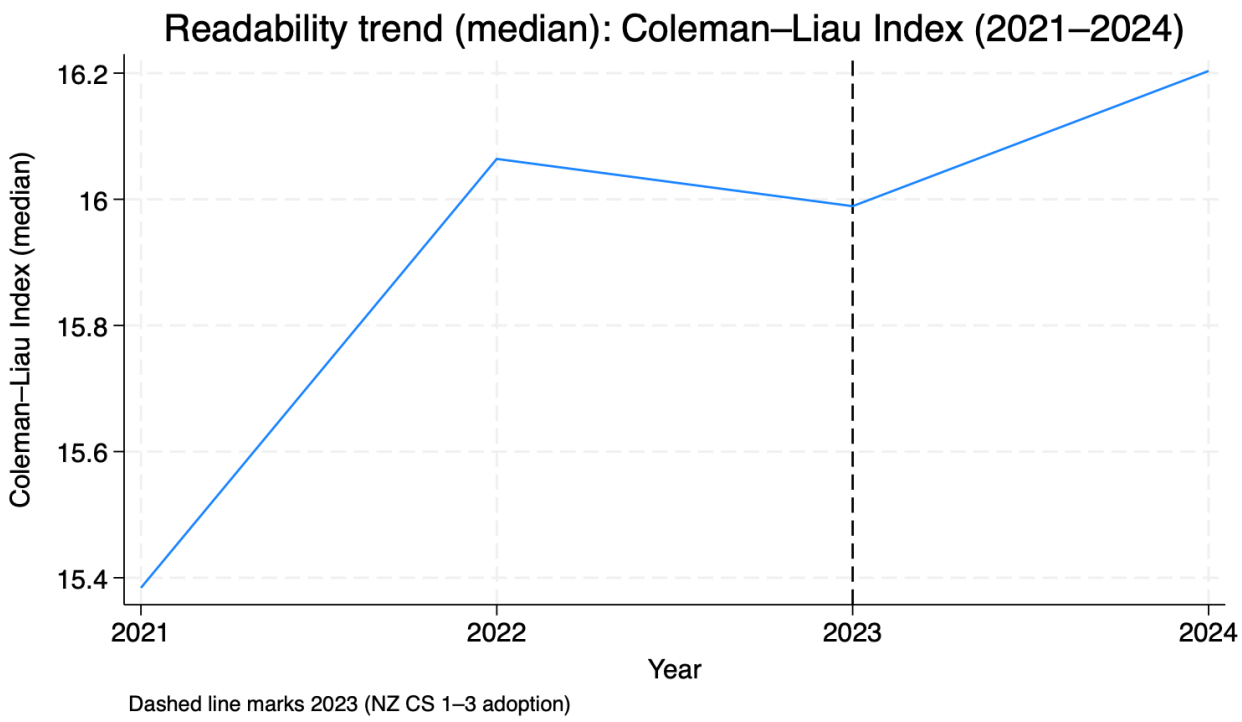
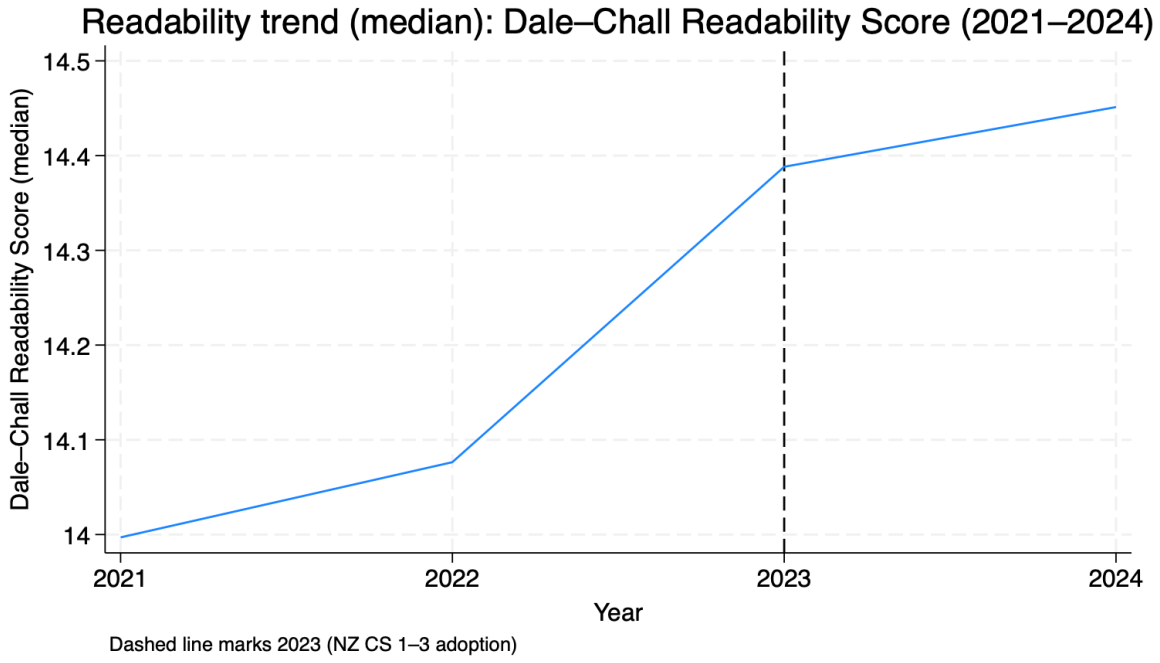


Figure 7

Median Dale-Chall Readability Score Around the Adoption of NZ CS 1–3 (2021–2024)



Across the four figures, the overall visual pattern is upward. For both CLI and DCRS, the annual mean values increase from 2021 to 2024. The median series shows a similar but more moderate pattern. Median CLI rises from 2021 to 2022, declines slightly in 2023, and then increases again in 2024. By contrast, median DCRS

shows a steadier increase across the full period. As higher CLI and DCRS values indicate greater textual difficulty, these patterns suggest that the readability of climate-related disclosures did not improve over the sample period. The pattern spans both the pre-implementation and early-implementation years, indicating a gradual increase in textual difficulty rather than a discrete shift at the introduction of NZ CS 1–3.

A further descriptive feature of the figures is that the mean series appears to follow a smoother and more even upward progression than the median series. In visual terms, the mean values rise more steadily across years, show less year-to-year irregularity, and appear to record a larger overall increase over the sample period. This suggests that the increase in textual difficulty may have been more pronounced for a subset of firm-year observations with relatively complex disclosures, rather than reflecting an equally strong shift across the entire sample. The pattern also appears clearer for DCRS than for CLI, as the DCRS median trend is more stable and consistently upward. For both measures, higher scores indicate lower readability. In other words, higher CLI and DCRS values suggest that the text is more difficult to read. Overall, the figures provide initial descriptive evidence of a decline in the readability of climate-related disclosures over the 2021–2024 period.

4.3.2 Descriptive Statistics of the RQ3

Table 4.4

Descriptive Statistics for RQ3 Variables

Variable	N	Mean	Median	SD	Min	Max
CLI	178	15.84	16.13	1.71	9.23	20.23
DCRS	178	14.38	14.24	1.19	10.45	19.16
Policy	178	0.52	1.00	0.50	0.00	1.00
E_Score	178	37.85	41.82	20.93	0.00	80.85
Size	178	3728.10	2131.89	3788.08	111.31	18601.00
ROA	178	0.04	0.05	0.09	-0.32	0.41
LEV	178	0.25	0.24	0.13	0.01	0.56
Env_Sens	178	0.37	0.00	0.48	0.00	1.00

Note. Table 4.4 presents descriptive statistics for the variables used in the RQ3 analysis. See Appendix A for variable definitions. Size is measured as total assets in NZD million. The sample comprises 178 firm-year observations across 47 firms for the 2021–2024 period.

Table 4.4 presents descriptive statistics for the variables used in the RQ3 analysis. The sample comprises 178 firm-year observations for 47 firms over the 2021–2024 period. The mean (median) *CLI* is 15.84 (16.13), placing the sample near the upper boundary of the difficult-to-read category on the CLI scale adopted in this study. This suggests that the climate-related disclosure text is written at an advanced grade level and is relatively difficult to read. The mean (median) *DCRS* is 14.38 (14.24). Both values fall within the highest category of the Dale–Chall scale and are interpreted as indicating very difficult text (Dale & Chall, 1948). This suggests that the disclosures would require a college graduate level of education or above to be read with ease and understanding. The mean *Policy* is 0.52, consistent with the final sample being distributed relatively evenly across the pre-adoption and post-adoption periods. The mean (median) *E_Score* is 37.85 (41.82). The relatively

large standard deviation of 20.93, together with the wide range from 0.00 to 80.85, indicates substantial variation in environmental pillar scores across firm-year observations.

For the control variables, the mean (median) *Size* is 3728.10 (2131.89) in NZD million, the mean (median) *ROA* is 0.04 (0.05), and the mean (median) *LEV* is 0.25 (0.24). The difference between the mean and median of Size, together with the large standard deviation and wide range, suggests that firm size is right-skewed and that the final sample includes substantial heterogeneity in firm scale. *ROA* also exhibits notable dispersion, ranging from -0.32 to 0.41, which indicates meaningful variation in profitability across firms and years. Table 4.4 also shows that 37% of the observations fall within environmentally sensitive industries.

Overall, the descriptive statistics indicate that the final RQ3 sample exhibits meaningful variation in readability, environmental performance, and core firm characteristics. This variation supports the subsequent multivariate analyses by allowing this study to examine the association between readability, environmental performance, and changes in readability following the adoption of NZ CS 1–3.

4.3.3 Correlation Matrix

Table 4.5

Correlations of RQ3 Variables

	Policy	E_Score	Size	ROA	LEV	Env_Sens
Policy	1.00					
E_Score	0.04	1.00				
Size	0.08	0.44***	1.00			
ROA	-0.09	-0.02	0.02	1.00		
LEV	0.03	0.10	0.05	-0.00	1.00	
Env_Sens	-0.03	0.06	0.41***	0.06	0.07	1.00

Note. Table 4.5 presents Pearson correlations for the main variables used in the regression analyses. Statistical significance is indicated by ***, **, and * at the 1 per cent, 5 per cent, and 10 per cent levels, two-tailed. See Appendix A for variable definitions. The sample comprises 178 firm-year observations across 47 firms for the period 2021–2024.

Table 4.5 presents Pearson correlations for the independent and control variables used in the regression analyses. None of the pairwise correlations exceed 0.8, suggesting that multicollinearity is unlikely to be a major concern.

Policy is not significantly correlated with *E_Score*, *Size*, *ROA*, *LEV*, or *Env_Sens*. This suggests that the policy-period indicator is not closely associated with the observed firm-level characteristics in the analytical sample.

The correlation matrix shows that *E_Score* is positively and significantly correlated with Size ($r = 0.44$, $p < 0.01$). This suggests that larger firms tend to have higher environmental pillar scores within the final sample. *Size* is also positively and significantly correlated with *Env_Sens* ($r = 0.41$, $p < 0.01$), indicating that firms operating in environmentally sensitive industries tend to be larger. By contrast, the remaining pairwise correlations are small and statistically insignificant.

Overall, the correlation matrix does not indicate serious multicollinearity and supports proceeding to the subsequent multivariate regression analyses.

4.3.4 Baseline Regression Results

Table 4.6 presents the results from estimating the baseline model in equation (1). The Hausman test results presented in Appendix Table C1 support the use of random-effects (RE) estimation for both readability measures. Accordingly, the discussion focuses on the RE results, with the fixed-effects (FE) estimates reported for comparison.

Table 4.6

Baseline Regression Results for Equation (1)

Variables	CLI	CLI	DCRS	DCRS
Policy	0.4004**	0.4778**	0.4326***	0.4191***
	(0.1974)	(0.2244)	(0.1368)	(0.1541)
E_Score	0.0015	-0.0001	0.0120**	0.0184*
	(0.0088)	(0.0149)	(0.0061)	(0.0103)
Size	0.0001	-0.0000	-0.0000	0.0000
	(0.0001)	(0.0002)	(0.0000)	(0.0000)
ROA	0.9920	2.6914	2.1212**	3.4204**
	(1.5090)	(1.9439)	(1.0421)	(1.3349)
LEV	-0.6293	0.7494	-0.3104	0.6059
	(1.4021)	(2.8908)	(0.9630)	(1.9853)
Env_Sens	-0.0148	—	0.0686	—
	(0.4382)		(0.3001)	
Constant	15.4506***	15.4120***	13.8244***	13.0678***
	(0.5117)	(1.1987)	(0.3514)	(0.8232)
Observations	178	178	178	178
Firms	47	47	47	47
R-squared	0.0491	0.0490	0.0533	0.1343
Firm fixed effects	No	Yes	No	Yes

Note. Table 4.6 presents regression results for equation (1). The sample comprises 178 firm-year observations from 47 New Zealand climate reporting entities over 2021–2024. Higher values of CLI and DCRS indicate lower readability. See Appendix A for variable definitions. In the fixed-effects models, *Env_Sens* is omitted because it is time-invariant within firms. Conventional, non-clustered standard errors are reported in parentheses. Firm-clustered results are presented in Appendix Table D1. *, **, and *** indicate significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively.

Table 4.6 provides the primary evidence for RQ3. *Policy* is positive and statistically significant under both readability measures in the baseline model. In the CLI regressions, the coefficients on *Policy* are 0.4004 in the RE model and 0.4778 in the FE model, both significant at the 5 per cent level. In the DCRS regressions, the coefficients on *Policy* are 0.4326 in the RE model and 0.4191 in the FE model, both significant at the 1 per cent level. Because higher CLI and DCRS values indicate lower readability, these estimates indicate that climate-related disclosures were less readable in 2023–2024 than in 2021–2022. In substantive terms, the RE

estimates indicate that observations in 2023–2024 have CLI values that are, on average, 0.40 points higher and DCRS values that are 0.43 points higher than those in the pre-policy period, conditional on the included covariates.

Equations (3) and (4) help clarify the results. The positive coefficient on *Policy* in the CLI regressions is consistent with an increase in textual difficulty attributable to longer word length, more complex sentence structures, or both. For DCRS, the positive *Policy* coefficient is consistent with greater textual difficulty through longer sentences and/or a higher proportion of difficult words. The *Policy* result is consistent with prior literature on the readability effects of new reporting requirements. Bakry *et al.* (2023) find that CSR report readability declined following the introduction of the second edition of the Sustainability Reporting Guide (SRG 2.0) in Malaysia. Ebaid (2023) finds a decline in annual report readability following IFRS adoption.

Among the firm-level controls, E_Score and ROA are positively associated with DCRS, but neither variable is statistically significant in the CLI models. *Size*, *LEV*, and *Env_Sens* are not statistically significant, although *Env_Sens* is omitted from the FE models because it is time-invariant within firms.

4.3.5 Supplementary Interaction Regression Results

Table 4.7 presents the results from estimating the supplementary interaction model in equation (2). The Hausman test results presented in Appendix Table C2 support the use of random-effects (RE) estimation for both readability measures. Accordingly, the discussion focuses on the RE results, with the fixed-effects (FE) estimates reported for comparison.

Table 4.7

Interaction Regression Results for Equation (2)

Variables	CLI	CLI	DCRS	DCRS
Policy	1.2669***	1.3886**	0.7871***	0.7943***
	(0.4133)	(0.4504)	(0.2892)	(0.3135)
E_Score	0.0077	-0.0012	0.0146**	0.0180*
	(0.0091)	(0.0147)	(0.0063)	(0.0102)
E_Score × Policy	-0.0231**	-0.0243**	-0.0094	-0.0100
	(0.0097)	(0.0105)	(0.0068)	(0.0073)
Size	0.0001	0.0000	-0.0000	0.0001
	(0.0001)	(0.0002)	(0.0000)	(0.0001)
ROA	0.6494	2.3759	1.9938*	3.2905**
	(1.4972)	(1.9157)	(1.0455)	(1.3336)
LEV	-0.4649	1.3947	-0.2430	0.8716
	(1.3893)	(2.8554)	(0.9673)	(1.9878)
Env_Sens	-0.0833	—	0.0409	—
	(0.4352)		(0.3025)	

Constant	15.1453***	15.0629***	13.6960***	12.9240***
	(0.5224)	(1.1879)	(0.3638)	(0.8270)
Observations	178	178	178	178
Firms	47	47	47	47
R-squared	0.0701	0.0882	0.0599	0.1472
Firm fixed effects	No	Yes	No	Yes

Note. Table 4.7 presents regression results for equation (2). The sample comprises 178 firm-year observations from 47 New Zealand climate reporting entities over 2021–2024. Higher values of CLI and DCRS indicate lower readability. See Appendix A for variable definitions. The interaction model adds *E_Score* × *Policy* to the baseline specification. The Policy coefficient represents the estimated difference between reporting periods when E_Score equals zero. In the fixed-effects models, *Env_Sens* is omitted because it is time-invariant within firms. Conventional, non-clustered standard errors are reported in parentheses. Firm-clustered results are presented in Appendix Table D2. *, **, and *** indicate significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively.

In Table 4.7, the Policy coefficient is interpreted at *E_Score* = 0. The coefficient on *Policy* remains positive and statistically significant across both readability measures. For CLI, the coefficients on *Policy* are 1.2669 in the RE model ($p < 0.01$) and 1.3886 in the FE model ($p < 0.05$). For DCRS, the coefficients on *Policy* are 0.7871 in the RE model ($p < 0.01$) and 0.7943 in the FE model ($p < 0.01$). *Policy* is positive and statistically significant across both readability measures, indicating that the difference in readability scores between 2023–2024 and 2021–2022 remains after adding the interaction term.

The positive *E_Score* coefficients remain significant in the DCRS regressions. The coefficients on *E_Score* are 0.0146 in the RE model ($p < 0.05$) and 0.0180 in the FE model ($p < 0.10$). Since higher DCRS values indicate lower readability, the positive coefficient on *E_Score* indicates an association between stronger environmental performance and lower readability in the pre-policy period.. By contrast, *E_Score* is not statistically significant in the CLI models.

In the CLI models, the coefficients on *E_Score* × *Policy* are negative and statistically significant in both specifications. The coefficients on *E_Score* × *Policy* are −0.0231 in the RE model ($p < 0.05$) and −0.0243 in the FE model ($p < 0.05$). The estimated difference in CLI between the policy and pre-policy periods is therefore smaller for firms with higher *E_Score*. By contrast, the interaction term is not statistically significant in the DCRS models. It suggests that the moderation result is measure-dependent and is reported as supplementary evidence alongside the baseline results in Table 4.6.

4.3.6 Additional Analyses of Report-type Composition

The preceding results suggest that climate-related disclosures became less readable during the NZ CS 1–3 policy period. At the same time, the policy period was accompanied by a change in where climate-related information appeared. Climate-related information in the sample was not reported through a single document type. In the earlier years, it was more often embedded within annual or sustainability reports. But after NZ CS 1–3 was published, standalone climate statements became increasingly common. Several firm-years also contain more than one retained climate-related report. For example, a firm-year could include both an annual report and a standalone climate statement.

In this study, readability is measured using the climate-related text retained for each firm-year. This means changes in the type and number of reports included in that firm-year may affect the resulting readability score. Therefore, the robustness checks in this section examine whether the main results hold after controlling for these observable changes in report type composition. Two additional controls are added to the baseline and interaction models. *CS_Any* equals one when a firm-year includes a standalone climate statement, and zero otherwise. *Multi_Report* equals one when a firm-year includes more than one retained climate-related report, and zero otherwise. Table 4.8 reports the robustness tests for the baseline model Equation (1), and Table 4.9 reports the corresponding tests for the interaction model Equation (2).

Table 4.8

Robustness Tests for the Baseline Model: Report-type Composition

	CLI	CLI	DCRS	DCRS
Panel A: plus CS_Any				
Policy	0.2937	0.3493	0.4413***	0.4103**
E_Score	0.0025	-0.0005	0.0119*	0.0184*
CS_Any	0.2642	0.3589	-0.0209	0.0248
Observations	178	178	178	178
Firms	47	47	47	47
Panel B: plus Multi_Report				
Policy	0.4458*	0.4945*	0.3261**	0.3279*
E_Score	0.0016	0.0001	0.0119**	0.0168
Multi_Report	-0.1091	-0.0453	0.2580	0.2461
Observations	178	178	178	178
Firms	47	47	47	47
Panel C: plus CS_Any and Multi_Report				
Policy	0.3620	0.4251*	0.3736**	0.3521**
E_Score	0.0037	0.0028	0.0108*	0.0158
CS_Any	0.5570	0.7164*	-0.3108	-0.2494
Multi_Report	-0.4503	-0.5499	0.4495*	0.4218
Observations	178	178	178	178
Firms	47	47	47	47
Firm fixed effects	No	Yes	No	Yes

Note. Table 4.8 reports robustness tests for the baseline model after the addition of report-type composition controls. *CS_Any* captures the presence of a standalone climate statement in the firm-year, and *Multi_Report* captures firm-years with more than one retained climate-related report. CS_Any and Multi_Report adjust for the presence of standalone climate statements and multiple retained reports, respectively. They do not change the report-specific text-extraction rules or the unweighted averaging of report-level readability scores. All regressions also include *Size*, *ROA*, *LEV*, and *Env_Sens*. In the FE models, *Env_Sens* is omitted because it is time-invariant within firms. *, **, and *** indicate significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. Statistical significance is based on conventional, non-clustered standard errors. Firm-clustered results are presented in Appendix Table D3.

4.3.6.1 Baseline Models with Report-type Controls

Table 4.8 reports the robustness tests for the baseline model after adding controls for report-type composition. Panel A adds *CS_Any*, Panel B adds *Multi_Report*, and Panel C includes both controls. The sample remains unchanged across all specifications, with 178 firm-year observations from 47 firms.

The results are partly consistent with the baseline model, but the degree of consistency differs across the two readability measures. When *CS_Any* is added in Panel A, the coefficient on *Policy* becomes statistically insignificant in the CLI models, with coefficients of 0.2937 in the RE model and 0.3493 in the FE model. By contrast, the DCRS results remain close to the baseline findings. The coefficient on Policy remains positive

and statistically significant in both DCRS specifications, at 0.4413 in the RE model and 0.4103 in the FE model. *CS_Any* itself is not statistically significant in any of the four specifications.

Panel B replaces *CS_Any* with *Multi_Report*. In this specification, the coefficient on *Policy* remains positive across both readability measures. For CLI, the coefficients on policy are 0.4458 in the RE model and 0.4945 in the FE model, both significant at the 10 per cent level. For DCRS, the coefficients on *Policy* are 0.3261 in the RE model ($p < 0.05$) and 0.3279 in the FE model ($p < 0.1$). *Multi_Report* is not statistically significant in any specification. Compared with Panel A, the *Policy* result is less weakened when the model controls for multiple-report firm-years rather than the presence of a standalone climate statement.

Panel C provides the more demanding specification by including *CS_Any* and *Multi_Report* together. The coefficient on *Policy* remains positive across both measurements, but the CLI result becomes weaker. In the CLI regressions, *Policy* is not statistically significant in the RE model ($\beta = 0.3620$) and is only marginally significant in the FE model ($\beta = 0.4251$). However, in the DCRS regressions, the coefficients on *Policy* are 0.3736 in the RE model and 0.3521 in the FE model, both significant at the 5 per cent level. The report-type controls show limited and inconsistent evidence of a separate association with readability. *CS_Any* is significant only in the CLI FE model, while *Multi_Report* is significant only in the DCRS RE model.

Overall, the baseline robustness tests provide stronger support for the DCRS results than for the CLI results. In the DCRS specifications, the coefficient on *Policy* remains positive and statistically significant after adding *CS_Any*, *Multi_Report*, and both controls together. This indicates that the baseline finding of lower readability during the NZ CS 1–3 policy period is retained when readability is measured by DCRS. By comparison, the CLI result weakens once these controls are included, with the *Policy* coefficient losing significance in some specifications. This suggests that the baseline CLI result is more sensitive to report-type composition, whereas the DCRS result remains more stable across robustness tests.

Overall, the robustness results indicate that the policy period decline in readability is more stable when readability is measured using DCRS. The CLI evidence is more sensitive to controls for the composition of report types.

Table 4.9

Robustness Tests for the Interaction Model: Report-type Composition

	CLI	CLI	DCRS	DCRS
Panel A: plus CS_Any				
Policy	1.1611***	1.2434**	0.8171***	0.7987**
E_Score	0.0080	-0.0014	0.0144**	0.0180*
E_Score × Policy	-0.0223**	-0.0231**	-0.0096	-0.0100
CS_Any	0.1886	0.2818	-0.0527	-0.0087
Observations	178	178	178	178
Firms	47	47	47	47
Panel B: plus Multi_Report				
Policy	1.4096***	1.4889***	0.6461**	0.6757**
E_Score	0.0081	-0.0001	0.0141**	0.0167
E_Score × Policy	-0.0244**	-0.0253**	-0.0081	-0.0088
Multi_Report	-0.2223	-0.1710	0.2206	0.2022

Observations	178	178	178	178
Firms	47	47	47	47
Panel C: plus CS_Any and Multi_Report				
Policy	1.3172***	1.4162***	0.7000**	0.7013**
E_Score	0.0099	0.0025	0.0130**	0.0158
E_Score × Policy	-0.0241**	-0.0252**	-0.0082	-0.0089
CS_Any	0.5425	0.7116*	-0.3156	-0.2511
Multi_Report	-0.5540	-0.6718	0.4147*	0.3789
Observations	178	178	178	178
Firms	47	47	47	47
Firm fixed effects	No	Yes	No	Yes

Note. Table 4.9 reports robustness tests for the interaction model after the addition of report-type composition controls. The interaction model includes *E_Score,* Policy, and *E_Score × Policy*, together with *Size, ROA, LEV,* and *Env_Sens*. *CS_Any* captures the presence of a standalone climate statement in the firm-year, and *Multi_Report* captures firm-years with more than one retained climate-related report. CS_Any and Multi_Report adjust for the presence of standalone climate statements and multiple retained reports, respectively. They do not change the report-specific text-extraction rules or the unweighted averaging of report-level readability scores. The Policy coefficient represents the estimated difference between reporting periods when E_Score equals zero. In the FE models, *Env_Sens* is omitted because it is time-invariant within firms. *, **, and *** indicate significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively. Statistical significance is based on conventional, non-clustered standard errors. Firm-clustered results are presented in Appendix Table D4.

4.3.6.2 Interaction Models with Report-type Controls

Table 4.9 reports the robustness tests for the supplementary interaction model after adding the same report-type controls. Panel A adds *CS_Any*, Panel B adds *Multi_Report*, and Panel C includes both controls. The results are generally consistent with the main interaction model.

When *CS_Any* is added in Panel A, the coefficient on *Policy* remains positive and statistically significant across both readability measures. For CLI, the coefficients on *Policy* are 1.1611 in the RE model ($p < 0.01$) and 1.2434 in the FE model ($p < 0.05$). For DCRS, the coefficients on *Policy* are 0.8171 in the RE model ($p < 0.01$) and 0.7987 in the FE model ($p < 0.05$). The interaction term *E_Score × Policy* also remains negative and significant in the CLI models, with coefficients of −0.0223 in the RE model and −0.0231 in the FE model, both significant at the 5 per cent level. By contrast, the interaction term remains statistically insignificant in the DCRS models. *CS_Any* itself is not significant in any of the four specifications.

Panel B replaces *CS_Any* with *Multi_Report*. The results are similar to the main interaction model. The coefficient on *Policy* remains positive and statistically significant in two measurements. For CLI, the coefficients on *Policy* are 1.4096 in the RE model and 1.4889 in the FE model, both significant at the 1 per cent level. For DCRS, the coefficients on *Policy* are 0.6461 in the RE model and 0.6757 in the FE model, both significant at the 5 per cent level. The coefficient on *E_Score × Policy* remains negative and significant in the CLI models, at −0.0244 in the RE model ($p < 0.05$) and −0.0253 in the FE model ($p < 0.05$). The DCRS interaction terms remain negative but statistically insignificant. *Multi_Report* is not statistically significant in any specification.

Panel C includes both report-type controls. The results continue to show a stable CLI interaction effect. The coefficient on *Policy* remains positive and statistically significant in all measurements, with coefficients of 1.3172 and 1.4162 in the CLI models, and 0.7000 and 0.7013 in the DCRS models. The coefficient on *E_Score × Policy* remains negative and statistically significant in both CLI models, at −0.0241 in the RE model ($p <$

0.05) and −0.0252 in the FE model ($p < 0.05$). In the DCRS models, the interaction term remains statistically insignificant. The report-type controls again show limited evidence of a separate association with readability. *CS_Any* is significant only in the CLI FE model, while *Multi_Report* is significant only in the DCRS RE model.

Overall, the report-type composition tests indicate that the main policy-period readability finding is strongest and most stable for DCRS, while the CLI results are more sensitive to the inclusion of standalone climate statements and multi-report controls. The interaction between *E_Score* and *Policy* should therefore be interpreted as measure-dependent.

Appendix D examines the sensitivity of these findings to firm-clustered standard errors. The positive baseline Policy coefficients retain statistical support, although the CLI RE estimate is significant only at the 10 per cent level. Some other associations also receive weaker support, including the baseline E_Score association with DCRS. The negative CLI interaction remains significant at the 5 per cent level, while the DCRS interaction remains insignificant. These differences qualify the strength of the evidence presented above.

Chapter 5: Discussion

5.1 Disclosure Extent and Reporting Format

5.1.1 Disclosure Extent During Early Implementation

The RQ1 results show a substantial increase in the extent of climate-related disclosure over the 2021–2024 period, with the sharpest increase in 2024. In addition, the increases in both the mean and median results indicate that the expansion was not driven only by a small number of high-disclosing CREs, but was evident across the broader sample during the early mandatory reporting period.

The timing of this increase is consistent with the introduction of NZ CS 1–3. The standards apply to reporting periods beginning on or after 1 January 2023 and require CREs to prepare climate-related disclosures under a common reporting framework (XRB, 2022a, 2022b). NZ CS 1 sets out disclosure requirements across governance, strategy, risk management, and metrics and targets (XRB, 2022b). These requirements changed the reporting environment by making climate-related disclosure more structured, explicit, and closely connected to formal reporting obligations. The increase in word count is therefore consistent with CREs providing more extensive textual disclosure to address the broader and more specific disclosure requirements introduced by NZ CS 1–3.

From an institutional theory perspective, the increase in the extent of disclosure can be interpreted as a response to stronger coercive pressure under the mandatory reporting regime. Coercive pressure arises from formal and informal pressures exerted on organisations by other organisations on which they depend, as well as from broader societal expectations (DiMaggio & Powell, 1983). In the context of this study, the introduction of NZ CS 1–3 strengthened the formal dimension of coercive pressure by turning climate-related disclosure into a mandatory reporting obligation. Before the introduction of NZ CS 1–3, CREs had greater managerial discretion over their climate-related reporting practices. CREs could decide how much climate-related information to disclose, how specific that information should be, and where it should be presented (Christensen *et al.*, 2021; XRB, 2022d; Haji *et al.*, 2022). The introduction of NZ CS 1–3 changed this setting by turning climate-related disclosure into a formal reporting obligation. This obligation exposed CREs to regulatory scrutiny of whether their climate statements met the applicable disclosure requirements. Non-compliance could create regulatory and reputational risks, giving CREs an incentive to align their reporting practices with the requirements of NZ CS 1–3. Under NZ CS 1–3, CREs were required to provide more explicit information about their governance, strategy, risk management, and metrics and targets in relation to climate-related risks and opportunities (XRB, 2022b). The increase in climate-related words may therefore reflect CREs expanding their disclosures to align with the formal requirements set out in NZ CS 1–3.

The increase in disclosure extent may also have a legitimacy dimension. Legitimacy theory suggests that organisations seek congruence between their activities and the norms of acceptable behaviour in the broader social system in which they operate (Dowling & Pfeffer, 1975). Prior accounting research further argues that social and environmental disclosures can be used to respond to legitimacy concerns and communicate

alignment with broader expectations (Cho & Patten, 2007; Deegan, 2002). In this study, the increase in climate-related words may be understood as part of CREs' adjustment to a more formalised reporting environment. It also suggests an effort to align disclosure practices with the expectations embedded in the mandatory regime. By responding to these requirements, CREs may seek to maintain legitimacy by showing that their reporting practices are aligned with the new institutional environment.

The increase in disclosure extent was most pronounced in 2024. The 2023 observations may capture only a partial transition into the first reporting cycle, whereas the 2024 observations more fully reflect CREs' mandatory climate-related disclosures (FMA, 2024; New Zealand Companies Office, n.d.). The difference in the coverage of the reporting cycle may explain the sharper increase in disclosure extent observed in 2024. Prior evidence from other mandatory environmental and climate-related disclosure settings supports this interpretation. Papa *et al.* (2022) find that environmental disclosure increased after the adoption of the EU Non-Financial Reporting Directive, especially for topics explicitly required by regulation. Perera *et al.* (2019) show that Australian companies affected by the National Greenhouse and Energy Reporting Act increased their climate-change-related disclosures relative to non-affected companies. These studies suggest that mandatory environmental and climate-related regimes can increase disclosure extent by strengthening the reporting expectations faced by regulated entities.

Overall, the evidence suggests that the early application of NZ CS 1–3 was associated with an increase in the extent of climate-related disclosure among New Zealand CREs. This increase was most pronounced in 2024. This pattern is consistent with stronger coercive pressure under NZ CS 1–3, where climate-related reporting shifted from a largely voluntary activity to a formal reporting obligation. The expansion of climate-related disclosure can be interpreted as part of CREs' adjustment to the new reporting environment. Such alignment with formal reporting expectations may also support their legitimacy under the mandatory regime.

5.1.2 Disclosure Format

The report-type analysis in Table 4.2 shows that the increase in disclosure extent was accompanied by a change in how climate-related information was presented. Annual reports remained the most common report type in the sample to include climate-related information, but their climate-related word count did not increase on the same scale as standalone climate statements. By 2024, climate statements accounted for the largest share of total climate-related words. Therefore, the increase in disclosure extent was not simply a matter of incorporating more climate-related information into annual reports. Rather, climate-related disclosure became increasingly concentrated in standalone climate statements.

Although the standalone climate statement has become the primary report type for climate-related disclosures in 2024, NZ CS 3 does not require CREs to adopt this report type. NZ CS 3 permits CREs to present climate-related information either through a standalone climate statement or in another document. However, if another document is used, CREs must include a table identifying the specific locations of the required disclosures (XRB, 2022d). This means that a standalone climate statement is not the only reporting format of climate disclosure under the NZ CS 1–3. Despite this flexibility, the use of standalone climate statements increased

substantially after the standards were introduced. By bringing climate-related disclosures into a single document, standalone climate statements provide a clear way to present the required information and distinguish it from broader corporate reporting.

As discussed in Section 5.1.1, the introduction of NZ CS 1–3 increased coercive pressure by turning climate-related disclosure into a formal reporting obligation (DiMaggio & Powell, 1983; XRB, 2022a, 2022b). This pressure may have affected not only the disclosed extent but also its presentation. NZ CS 3 requires climate-related disclosures to be clearly identifiable to users, which may have encouraged CREs to reconsider how climate-related information was organised within broader corporate reporting (XRB, 2022d). However, because NZ CS 3 allows flexibility in reporting format, coercive pressure alone does not fully explain the shift towards standalone climate statements.

Mimetic pressure may have been particularly relevant during the early stage of the mandatory reporting regime. Although NZ CS 3 specifies the information that CREs must disclose, CREs retain discretion over the report type used to present that information. In the absence of an established reporting practice, CREs may look to other organisations when deciding how to respond to new requirements. DiMaggio and Powell (1983) describe this process as mimetic isomorphism, whereby organisations facing uncertainty may model their practices on those of other organisations. In this study, a small number of CREs had already issued standalone climate statements before NZ CS 1–3. The subsequent growth of standalone climate statements suggests that these earlier practices may have provided a useful reference point as CREs adapted to the new reporting regime.

The transition to mandatory climate reporting may also increase the relevance of normative pressure. Normative pressure arises when professional standards and shared practices influence how organisations are expected to report (DiMaggio & Powell, 1983). As NZ CS 1–3 bring climate-related disclosure into formal corporate reporting, CREs may increasingly be expected to follow more standardised reporting practices. Bebbington *et al.* (2012) identify a similar process in UK environmental reporting, where standalone reports became an established practice despite the absence of a formal legal requirement. The growing use of standalone climate statements may reflect this broader shift towards more standardised climate reporting.

The shift towards standalone climate statements also has a legitimacy dimension. Under NZ CS 1–3, climate-related disclosure became a formal reporting obligation rather than a voluntary communication choice. NZ CS 1 requires entities to disclose information about governance, strategy, risk management, and metrics and targets in relation to climate-related risks and opportunities (XRB, 2022b). Therefore, these disclosures are connected to how entities explain their climate-related responsibilities to external users. Legitimacy theory suggests that organisations use public disclosure to show that their activities and responses are consistent with social expectations, especially when they operate in areas subject to public and regulatory scrutiny (Deegan, 2002; Suchman, 1995). In this context, a standalone climate statement may present climate-related governance and risk responses as a distinct area of accountability. This format makes climate-related information more visible, rather than leaving it embedded within broader corporate reports. This does not mean that standalone statements are necessarily better or more informative. Rather, it suggests that the use of a separate climate

statement may help CREs demonstrate that climate reporting is being treated as a formal and visible part of corporate accountability under the mandatory regime.

The relationship between regulation and reporting format has also been discussed in the broader mandatory non-financial reporting literature. Studies of the EU non-financial reporting regime show that firms may present non-financial information through different reporting formats, including annual reports, management reports, sustainability reports, integrated reports, or separate non-financial reports (Carmo & Ribeiro, 2022; García-Benau *et al.*, 2022). This literature indicates that regulation can affect not only the quantity of disclosure, but also the location and organisation of non-financial information. The RQ1 findings are consistent with this view. During the early implementation of NZ CS 1–3, the expansion in climate-related disclosure was accompanied by changes in how that information was structured, located and made visible within corporate reports.

Overall, this study finds that the expansion in disclosure extent was accompanied by changes in the presentation of climate-related information. After the implementation of NZ CS 1–3, climate-related disclosure by CREs became more separate, identifiable and concentrated in dedicated climate statements. This suggests that NZ CS 1–3 was associated not only with an expansion in the extent of climate-related disclosure but also with the institutionalisation of climate-related reporting as a more visible component of corporate reporting.

5.1.3 Industry Variation in Disclosure Extent

Table 4.3 shifts the discussion from whether the extent of disclosure has expanded to the distribution of this increase across industries. The 10 industry groups in this study were constructed based on the classification logic of the Global Industry Classification Standard (GICS), supplemented by information provided by the NZX. Each CRE was assigned to an industry based on its primary business activities. Following the implementation of the NZ CS 1–3, the extent of climate-related disclosure increased across all 10 industries in the sample. The findings are consistent with NZ CS 1–3, as the standards apply to all CREs rather than specific industries.

Although the extent increased across all 10 industries after NZ CS 1–3, the scale of the increase varied by industry. This suggests that NZ CS 1–3 established a common disclosure framework, but the reporting response remained shaped by industry-specific legitimacy pressures. Legitimacy theory suggests that organisations use disclosure to demonstrate that their activities and responses are consistent with broader social expectations, particularly when their activities are subject to public scrutiny or environmental concerns (Deegan, 2002; Dowling & Pfeffer, 1975; Suchman, 1995). For example, the Utilities & Energy and Transportation sectors are environment-sensitive industries that may face higher pressure, because their activities are more closely linked to emissions, infrastructure, fuel use, and energy transition risks. In New Zealand, the transport and electricity sectors are among the primary sources of greenhouse gas emissions, making these industries more visible to public attention and scrutiny (Ministry for the Environment, 2024; MBIE, 2024). Prior environmental disclosure research suggests that environmentally sensitive industries, such as Utilities & Energy and Transportation, face more visible pressures and greater public or regulatory scrutiny (Cho *et al.*, 2006; Kılıç

& Kuzey, 2019). These pressures may have created stronger incentives for firms in these industries to provide more extensive disclosures under NZ CS 1–3 in order to build, maintain, or enhance their legitimacy.

Beyond highly environmentally sensitive industries, other industries in the sample face climate-related pressures through their exposure to financial, operational, or asset-related risks. For example, although the Financial Services and Real Estate sectors do not generate significant direct emissions, climate risks can impact their core business activities. For financial institutions, these climate risks may affect borrowers' repayment capacity, the value of loan collateral, and financing decisions (Reserve Bank of New Zealand, 2024; TCFD, 2017). Similarly, Real Estate assets are long-term in nature and may be affected by flooding, insurance costs, energy-efficiency requirements, and the transition to lower-emission buildings (Baldauf *et al.*, 2020; Eichholtz *et al.*, 2010). Because these risks can influence investors' and lenders' assessments of credit risk, asset value, and the resilience of future cash flows, firms in these sectors may face pressure to provide more detailed explanations of their climate-related exposures. Therefore, although these industries may be less emissions-intensive, they may still face pressure to provide more extensive climate-related disclosure in order to maintain or enhance their legitimacy.

Previous research on carbon emissions and environmental disclosure has also shown that disclosure practices vary across industries due to differences in the environmental risks firms face, public attention, and stakeholder scrutiny (Choi *et al.*, 2013; Prado-Lorenzo *et al.*, 2009; Rankin *et al.*, 2011). The findings of this study are consistent with this literature. NZ CS 1–3 created a common reporting requirement for all CREs, but the extent of disclosure remained shaped by industry-level exposure, visibility, and stakeholder pressure. Therefore, the industry-level results suggest that mandatory climate reporting does not remove industry differences. Instead, it interacts with existing industry characteristics to produce uneven increases in climate-related disclosure.

Overall, the results for Research Question 1 (RQ1) indicate that the extent of climate-related disclosures in the CRE sample expanded significantly following the implementation of NZ CS 1–3. This increase was most pronounced in 2024, with the median value rising sharply, suggesting that this expansion was not limited to a small number of highly disclosing CREs. The report-type results show that this expansion was accompanied by a change in the presentation of climate-related information. Climate-related disclosures are increasingly concentrated in standalone climate statements rather than being primarily distributed across annual reports. The industry results further show that disclosure extent increased across all 10 industries, although the scale of the increase varied by industry.

From an institutional perspective, the overall increase is consistent with the stronger reporting expectations created by the mandatory regime. The uneven industry-level response is also consistent with differences in sector-specific visibility, risk exposure, and legitimacy pressures. In this way, RQ1 suggests that mandatory climate reporting created a common reporting framework, but did not remove the influence of industry context on the extent of disclosure.

5.2 Thematic Coverage

After RQ1 examined changes in the extent of climate-related disclosure, RQ2 shifts the analysis to the climate-related disclosure themes that appeared most frequently in the 2024 corpus. The findings show that climate-related disclosure in 2024 was not evenly distributed across the NZ CS 1 disclosure pillars or across the 12 reporting themes developed in this study. Strategy and Metrics and Targets were the most visible pillars in the corpus, while Governance and Risk Management were less widely represented. At the theme level, GHG emissions and reporting basis, Climate impacts and exposure, and Transition planning were the most prevailing themes, whereas Risk response and review had the lowest document-level coverage. From an institutional perspective, NZ CS 1–3 created a common source of coercive pressure for CREs, requiring them to comply with the new disclosure requirements (DiMaggio & Powell, 1983; Scott, 2014). The results for RQ2 raise a question: why did pillar and thematic coverage remain uneven under the same mandatory disclosure standard? This section interprets the RQ2 findings through institutional isomorphism and legitimacy theory.

5.2.1 Institutional Influences on Theme Coverage

Beyond the coercive pressure imposed by NZ CS 1–3, the uneven coverage of themes can also be explained through normative and mimetic institutional pressures. Normative pressures are crucial because climate-related disclosure is influenced not only by formal disclosure requirements but also by professional standards, accepted reporting practices, and shared expectations about what credible climate-related disclosures should include (DiMaggio & Powell, 1983; Scott, 2014).

An obvious example is *GHG emissions and reporting basis*, the most prevalent theme in the RQ2 findings. As Table 3.1 showed, climate-related information and GHG reporting had already appeared before 2024. In addition, before the introduction of NZ CS 1–3, GHG emissions reporting had gradually become standardised through CDP, the GHG Protocol, and related carbon accounting practices (Andrew & Cortese, 2012; WRI & WBCSD, 2004, 2011). Kolk *et al.* (2008) describe carbon disclosure as an institutionalised and standardised process, while Matisoff *et al.* (2013) find that CDP reporting tends to align with mainstream standards and reporting methods. De Villiers and Alexander (2014) similarly show that CSR reporting can become institutionalised through reporting templates and professionalisation. It suggests that, compared with many other climate-related themes, emissions disclosure entered the mandatory reporting regime with a stronger professional and methodological foundation.

The impact of normative pressure is not limited to the emissions theme. It also suggests that, when NZ CS 1–3 began to be implemented, CREs did not have the same disclosure capacity across all themes. Themes supported by more developed professional terminology, recognised classifications, or familiar reporting practices were more likely to appear in climate-related disclosures (de Villiers & Alexander, 2014; DiMaggio & Powell, 1983). In this sense, uneven thematic coverage reflects not only the formal requirements of NZ CS 1–3 but also the uneven professionalisation of climate disclosure practices themselves. Normative pressure helps explain why climate disclosures in 2024 used the same framework, while some disclosure themes still appeared less frequently than others.

Mimetic pressure further explains the uneven coverage of themes. The first full mandatory reporting cycle created uncertainty for CREs, as firms had to decide not only what climate-related information to disclose but also how to present it. This reflects mimetic pressure, as organisations often refer to recognised practices within their field when objectives are unclear or appropriate responses are uncertain (DiMaggio & Powell, 1983; Haveman, 1993). In climate reporting, firms may have looked to reporting guidance, professional examples, and peer climate statements when deciding how to present climate-related information (Haveman, 1993; Scott, 2014).

This helps explain why some themes appeared more frequently than others in the 2024 corpus. The most common themes may have been the disclosure areas for which clearer, more visible reporting forms were already available for firms to follow. By contrast, themes with lower coverage may reflect disclosure forms that had not yet stabilised in public reporting practice, or that rely more heavily on entity-specific internal processes and explanations. For example, in the RQ2 coding framework, *risk response and review* covered disclosures about how climate-related risks were addressed, monitored, reassessed, and integrated into the organisation's day-to-day operations (XRB, 2022b). Such disclosures may be more difficult to replicate from external examples because they depend more closely on each entity's internal risk systems, controls, and review processes. Previous TCFD-related research also suggests that climate-related disclosure is often uneven across disclosure categories, particularly where implementation requires firms to develop more detailed processes, assumptions, or reporting capabilities (Chua *et al.*, 2022; Eccles & Krzus, 2019; Ehalaiye *et al.*, 2025). From this perspective, the results for RQ2 may indicate that disclosure practices in the first mandatory reporting cycle formed more readily around reporting forms that were easily observable or replicable.

Overall, normative and mimetic isomorphism provide a cautious explanation for the uneven thematic coverage identified in RQ2. The findings are consistent with prior evidence that climate-related disclosure does not develop evenly across all reporting areas. For example, Auzepy *et al.* (2023) found variation in disclosure levels across the disclosure themes by the TCFD Recommendations, suggesting that firms do not adopt or implement all areas of climate-related disclosure at the same pace.

Under the new mandatory reporting environment, firms faced uncertainty not only about how to comply with NZ CS 1–3 but also about how to translate climate-related matters into credible, usable public disclosures. Themes supported by more developed professional norms, shared reporting practices, or visible reporting examples may have been easier to implement and disclose consistently. This suggests that the first full mandatory reporting cycle produced a recognisable but uneven pattern of thematic development, rather than uniform disclosure across all climate-related reporting themes.

5.2.2 Legitimacy and Theme Coverage

Legitimacy theory offers another perspective on the uneven thematic coverage observed in RQ2. Legitimacy theory suggests that organisations use disclosure to demonstrate that their behaviours are consistent with broader social expectations (Dowling & Pfeffer, 1975; Suchman, 1995). Prior environmental accounting research indicates that firms may use disclosure to respond to legitimacy pressures, particularly when

environmental issues attract public or media attention (Brown & Deegan, 1998; Cho & Patten, 2007; Deegan, 2002). This perspective is particularly useful in the context of mandatory climate reporting under NZ CS 1–3. Firms are required not only to disclose climate-related information but also to present that information in a way that demonstrates accountability, responsiveness, and preparedness to report to users (Dowling & Pfeffer, 1975; XRB, 2022b, 2022d).

From this perspective, the 12 themes identified in RQ2 can be understood as carrying different forms of external communicative value. *Governance* themes explain who is responsible for overseeing climate-related matters and how responsibilities are allocated. *Strategy* themes connect climate change to business models, risk exposure, resilience, and transition positioning. *Risk management* themes explain how climate-related risks are identified, assessed, integrated, managed, and reviewed. *Metrics and targets* themes translate climate-related matters into emissions information, metrics, targets, and descriptions of performance (XRB, 2022b). In this way, these themes provide CREs with different ways to demonstrate alignment with the expectations of regulators, investors, and broader stakeholders.

This helps connect the theory with the findings for RQ2. The *strategy* and *metrics and targets* pillars were more prevalent in the 2024 corpus, which may reflect their stronger legitimacy value in public reporting. They allow CREs to show users how climate change is connected to business planning, performance measurement, targets, and future responses, thereby supporting alignment with external expectations (Deegan, 2002; XRB, 2022b; Suchman, 1995). This interpretation is consistent with legitimacy theory, as such disclosures help organisations demonstrate conformity with external expectations around accountability and preparedness (Deegan, 2002; Dowling & Pfeffer, 1975; Suchman, 1995).

It explains why thematic coverage was uneven in 2024. Some themes may have offered firms a more direct way to communicate claims with external significance. For example, the theme of *transition planning* presented forward-looking responses through strategic change, adaptation, investment, product innovation, or business planning (XRB, 2022b). For example, in its disclosure regarding the JOLI™-branded apple, T&G Global presented product innovation as part of its transition plan towards stronger climate resilience through diversification across growing regions, varieties, and brands (T&G Global, 2024). Such disclosure helps CREs show that climate-related matters have been incorporated into their business decision-making, thereby maintaining the support from external audiences (Deegan, 2002; Suchman, 1995).

By contrast, themes that focus more on internal processes may provide a less direct form of public communication. For example, *risk response and review* involve the ongoing management, monitoring, reassessment, and review of climate-related risks (XRB, 2022b). These disclosures are important for understanding how firms manage climate-related risks internally. However, compared with emissions or transition planning themes, they may be more closely tied to entity-specific internal processes. This may indicate that process-oriented climate risk management content had not yet fully developed into a stable public disclosure theme during the first full mandatory reporting cycle.

Legitimacy theory suggests that uneven thematic coverage may partly reflect the fact that different themes did not receive the same level of attention in 2024. Some themes may be more useful for demonstrating alignment with social, regulatory, and investor expectations, and may receive greater attention for that reason. By contrast, themes that depend more heavily on internal processes, ongoing monitoring, or entity-specific explanations may be more difficult to translate into clear and direct public expressions of legitimacy.

5.2.3 Early Implementation and Theme Coverage

In addition to institutional and legitimacy theories, the uneven thematic coverage observed in RQ2 may also reflect the early implementation stage of New Zealand's climate reporting regime. NZ CS 2 acknowledges that certain climate-related disclosure requirements may be difficult to implement immediately. NZ CS 2 provides first-time adoption relief for specific areas, for example, financial impacts, transition planning, and Scope 3 greenhouse gas emissions (XRB, 2022c). Although the content of these areas varies, they all require CREs to develop data, methods, assumptions, or internal processes before disclosures can be prepared consistently.

Themes that relied on existing measurement categories or familiar disclosure language may have been easier to present in early reporting. Some themes may have been less visible because NZ CS 2 adoption provisions allowed CREs to omit certain disclosures in the first reporting period (XRB, 2022c). By contrast, themes requiring CREs to develop technical capacity, data systems, and internal capability may take longer to report consistently. Therefore, the thematic pattern identified in RQ2 may partly reflect the practical challenges of translating complex climate-related issues into public disclosure during the first full mandatory reporting period.

Overall, RQ2 identifies uneven thematic coverage during the first full mandatory reporting cycle. The coercive pressure of NZ CS 1–3 created a common reporting obligation, but the prevailing themes were also shaped by other factors. Institutional theory, legitimacy theory, and the New Zealand Climate Standards together help explain this uneven coverage of disclosure themes.

5.3 Readability

RQ3 examines how the readability of climate-related disclosures changed during the NZ CS 1–3 policy period. In this study, readability refers to the linguistic difficulty of the climate-related disclosure text (Li, 2008; Loughran & McDonald, 2014). The findings of RQ3 indicate that climate-related disclosures became more difficult to read during the policy period. This pattern is evident in the descriptive trends and is also supported by the panel regression results, although the strength of the evidence varies across measures that represent different dimensions of readability. These findings relate to the final data-available sample of 47 firms, which is predominantly made up of listed entities, and should not be generalised to all New Zealand CREs.

The RQ3 findings are not fully aligned with the communication-oriented objectives of NZ CS 1–3. The mandatory climate reporting regime seeks to promote more consistent, comparable, and decision-useful climate-related disclosure (XRB, 2022b). NZ CS 3 identifies understandability as a presentation principle, describing it as the presentation of information in a clear and concise manner (XRB, 2022d). The RQ3 findings

indicate that climate-related disclosures were less readable during the early NZ CS 1–3 policy period. This pattern is consistent with the possibility that mandatory climate reporting increased the technical and linguistic demands of disclosure, although the design does not isolate NZ CS 1–3 from other contemporaneous developments in climate reporting.

The following discussion examines this gap by considering the institutional pressures created by NZ CS 1–3 and the legitimacy concerns that shape how CREs present climate-related information. This approach allows the readability findings to be interpreted not only as a change in textual difficulty but also as part of a broader reporting response to the early development of mandatory climate reporting in New Zealand.

5.3.1 Institutional Pressures and Readability

Institutional theory offers a useful framework for interpreting the increase in readability difficulty during the NZ CS 1–3 policy period. Corporate reporting practices are not shaped only by firm-level choices. They are also influenced by institutional pressures, particularly coercive pressure arising from regulation and normative pressure arising from professional expectations about appropriate reporting practice (DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Scott, 2014). NZ CS 1–3 introduced mandatory reporting requirements that changed how New Zealand CREs were expected to prepare and present climate-related disclosures. In this setting, NZ CS 1–3 represent the primary source of coercive institutional pressure because they transform climate-related disclosure from a largely discretionary practice into a formal reporting obligation.

Before the mandatory regime, firms had greater discretion over the scope and depth of climate-related reporting. Climate information could appear as a broad discussion of sustainability initiatives, emissions reduction, or environmental commitments. However, under NZ CS 1–3, the disclosure task became more structured. Firms were required to explain climate-related matters in relation to governance, strategy, risk management, and metrics and targets (XRB, 2022b). These requirements provide a possible explanation for the more technically demanding reporting discussed below.

This change is evident in the information that firms are now required to disclose. NZ CS 1 requires entities to explain how they identify, assess, govern, measure, and incorporate climate-related risks and opportunities into strategy and risk management processes (XRB, 2022b). NZ CS 3 further identifies understandability as a presentation principle, describing it as the presentation of information in a clear and concise manner. It also states that climate-related disclosures should communicate information to primary users, provide sufficient granularity for sophisticated users, and avoid generic or boilerplate information and unnecessary duplication (XRB, 2022d). These requirements create a demanding reporting task. Much information requires explanation, such as scenario analysis, transition risks, physical risks, climate-related metrics, and targets. These items require more than a statement that the firm recognises climate change as important. They require an explanation of methods, processes, estimates, and judgements (XRB, 2022b, 2022d). As climate-related reporting becomes integrated into formal corporate reporting, normative pressures arising from professionalisation may shape how these technical matters are expressed, including the use of structured and specialised reporting language (DiMaggio & Powell, 1983; Scott, 2014).

This provides a closer link between institutional pressure and the readability results. The Coleman–Liau Index is affected by word length and sentence structure, while the Dale–Chall Readability Score is affected by sentence length and the proportion of words outside the easy-word list (Coleman & Liau, 1975; Dale & Chall, 1948). When mandatory disclosure requires firms to discuss specialised climate concepts, methods, and assumptions, the resulting text may contain longer words, more difficult vocabulary, and more complex sentence structures. The increase in CLI and DCRS during the policy period is consistent with the interpretation that the early institutionalisation of climate reporting was accompanied by changes in the linguistic form through which climate-related information was communicated.

Prior accounting research suggests that more detailed reporting requirements can increase the textual complexity of corporate narratives. In the IFRS setting, Efretuei *et al.* (2022) show that the adoption of more extensive accounting standards increased the common complexity of UK narrative reporting. Their evidence argues increase in complexity was linked to the information demands of the standards, rather than necessarily to managerial obfuscation. Related New Zealand evidence also suggests that IFRS adoption contributed to disclosure overload and less readability (Morunga & Bradbury, 2013; Richards & van Staden, 2015). These findings indicate that standard-setting may broaden the scope and specificity of reporting while also making the resulting text more difficult to process.

The policy period findings should also be interpreted in light of their timing. The 2023–2024 observations cover the first mandatory reporting cycles under NZ CS 1–3, and the FMA noted that CREs had only a short time to understand the requirements and prepare their first mandatory climate statements (FMA, 2024). NZ CS 2 also provides first-time adoption reliefs in areas where immediate full application may be difficult, including anticipated financial impacts and Scope 3 greenhouse gas emissions (XRB, 2022c). This context suggests that the observed increase in textual difficulty may partly reflect early implementation conditions. However, the study does not directly measure reporting capability or organisational learning.

5.3.2 Legitimacy, Regulatory Compliance and Readability

A further explanation concerns the regulatory status of climate-related disclosure under NZ CS 1–3. NZ CS 1–3 were implemented within a mandatory climate-related disclosure regime, rather than as voluntary reporting guidance. Under the amended Financial Markets Conduct Act, climate reporting entities are required to prepare, lodge, and retain climate-related disclosure records. The FMA is also responsible for independent monitoring and enforcement of the regime. This legal setting changes the character of the disclosure task. Therefore, climate statements are not only communication documents for users. They are also public regulatory documents through which entities demonstrate compliance with the standards' requirements.

This regulatory setting is relevant to legitimacy theory. Legitimacy theory suggests that organisations under external scrutiny use disclosure to align themselves with prevailing social and institutional expectations (Deegan, 2002; O'Donovan, 2002; Suchman, 1995). Environmental disclosure research similarly shows that corporate narratives may be shaped by efforts to manage impressions and respond to external pressure (Cho *et al.*, 2010; Marquis *et al.*, 2016). In the NZ CS 1–3 setting, this helps explain why early climate statements may

have emphasised completeness, credibility, and preparedness, even when this produced more formal, less readable disclosure language.

This interpretation is consistent with accounting research on regulated disclosure language. Humphery-Jenner *et al.* (2024) find that litigation risk reduces financial-report readability. They argue that firms' efforts to manage legal exposure can increase report length, complexity, and difficult linguistic features. Cazier *et al.* (2021) provide a related explanation in the risk-disclosure setting: lengthy, boilerplate risk-factor language is less likely to be deemed inadequate in judicial and regulatory assessments. These studies suggest that, under a regulated disclosure regime, firms may have incentives to draft in a way that is complete and defensible, even if the resulting text is less concise and less accessible. Although the New Zealand setting is not identical to the US litigation-risk environment examined in prior financial disclosure studies. The literature shows that reviewability and legal defensibility can shape disclosure language. In the NZ CS 1–3 setting, similar drafting incentives may arise from the need to prepare climate statements that can withstand regulatory review, assurance-related scrutiny, and stakeholder challenge.

In the NZ CS 1–3 setting, climate disclosures often include forward-looking statements, assumptions, reporting boundaries, estimates, and methodological choices (XRB, 2022b, 2022d). In seeking to present climate-related information in a credible and reviewable form, firms may provide fuller explanations of reporting boundaries, assumptions, methods, and areas of uncertainty. These explanations can strengthen transparency, but they may also make the disclosure longer, more qualified, and harder to process.

5.3.3 Differences Between Readability Measures

Although both CLI and DCRS indicate lower readability during the NZ CS 1–3 policy period, they do not capture identical textual features. Therefore, this section considers whether their different linguistic components incorporated in CLI and DCRS help interpret the common *Policy* results. Both measures incorporate a sentence-related component, although they operationalise it differently. DCRS uses average sentence length directly, whereas CLI uses sentences per 100 words, which is inversely related to sentence length (Coleman & Liau, 1975; Dale & Chall, 1948). Since sentence-related difficulty is common to both measures, the more analytically important distinction in this study lies in their non-sentence components. CLI captures character-based word length through letters per 100 words, while DCRS captures lexical familiarity through the proportion of difficult words identified against the Dale–Chall easy-word list (Coleman & Liau, 1975; Dale & Chall, 1948). This distinction is consistent with recent accounting research, which treats readability as a linguistic attribute shaped by sentence length, familiar words, vocabulary, and writing style rather than by a single textual feature (Li *et al.*, 2023).

The positive *Policy* coefficients under both measures provide the most consistent result in RQ3. Because the CLI and DCRS draw on different textual components, this pattern suggests that the increase in textual difficulty during the policy period is not dependent on a single readability formula. It may instead reflect a decline in readability. However, the study does not examine the individual components of either measure separately. It

cannot determine which factor contributed most to the increase during the policy period, nor can it distinguish the effects of sentence structure, word length, and specialised vocabulary.

In conclusion, this comparison adds an important qualification to the contribution of RQ3. Within the final RQ3 sample, changes in readability during the early mandatory reporting period are evident across two measures that capture different linguistic components. This helps to interpret the RQ3 findings and shows why research on the readability of climate-related disclosures should not rely on a single measure.

Chapter 6: Conclusions

6.1 Synthesis of Findings and Contributions

6.1.1 Expansion and Visibility of Climate-related Disclosure

The first contribution of this study is an empirical analysis of climate-related disclosure extent during New Zealand's transition to mandatory climate reporting. The results show that climate-related disclosure increased substantially between 2021 and 2024, with the largest increase occurring in 2024. The rise in the median indicates that this expansion was not confined to a small number of firms with unusually extensive disclosures. Rather, higher levels of disclosure became more widespread across the sample of CREs.

Although the magnitude of the increase varied across industries, all ten industries showed growth. This suggests that common reporting requirements were associated with a broad increase in disclosure extent, while the scale of reporting responses remained shaped by industry context. The distribution of report types also changed over the study period. Climate-related information became increasingly concentrated in standalone climate statements, while the share of annual reports declined in 2024.

The findings contribute to the mandatory disclosure literature in three ways. First, RQ1 extends existing evidence on mandatory non-financial reporting to the New Zealand climate reporting setting. Prior research suggests that mandatory reporting requirements can increase environmental and sustainability disclosure (Ottenstein *et al.*, 2021; Papa *et al.*, 2022). This study adds evidence on mandatory climate-related disclosure by CREs during the early implementation of NZ CS 1–3. RQ1 also adds distributional detail to the literature. The increase in the median disclosure extent in 2024 indicates that the expansion was not driven solely by a small group of firms with unusually extensive disclosures. By considering both the mean and the median, this study provides a more complete description of the distribution of disclosure extent in corporate reporting.

Second, RQ1 adds a report-type dimension to research on mandatory disclosure. Earlier studies have mainly examined whether regulation changes the quantity of non-financial disclosure. This study shows that climate-related disclosure shifted towards dedicated climate statements. It extends prior research suggesting that regulation can affect both the quantity of non-financial disclosure and the way such information is organised in corporate reports (Carmo & Ribeiro, 2022; Christensen *et al.*, 2021; García-Benau *et al.*, 2022). In New Zealand, this shift occurred within a regulatory framework that permits firms to disclose climate-related information in a standalone climate statement or another report, provided that the required information is clearly identifiable (XRB, 2022d). The RQ1 findings show how flexibility in reporting format was reflected in the observed distribution of disclosure extent during the early reporting period.

Third, the cross-industry evidence also supports a theoretical interpretation of mandatory climate reporting. Institutional theory suggests that NZ CS 1–3 establish common mandatory reporting expectations for CREs (DiMaggio & Powell, 1983; Scott, 2014). Industry-level variation, however, indicates that common regulatory requirements do not remove the influence of industry contexts. Earlier environmental disclosure research also

shows that disclosure practices differ across industries because firms face different environmental risks and levels of external attention (Choi *et al.*, 2013; Prado-Lorenzo *et al.*, 2009; Rankin *et al.*, 2011). Legitimacy theory provides a complementary explanation. Firms in industries subject to greater environmental or climate-related scrutiny may face stronger external expectations to explain their activities and risk exposure (Deegan, 2002; Dowling & Pfeffer, 1975; Suchman, 1995). These theories help interpret the industry pattern, although the present analysis does not directly examine firms' motivations.

Overall, RQ1 extends the analysis of mandatory climate reporting beyond whether firms disclose more information. It shows that the study of disclosure extent also requires attention to its distribution across firms, its organisation across report types, and variation between industries. RQ1 therefore establishes disclosure extent and its distribution as the first analytical dimension of this thesis.

6.1.2 Variation in the Content of Climate-Related Disclosure

The second contribution of this study is an empirical analysis of the thematic content of climate-related disclosure during New Zealand's first full mandatory reporting cycle. RQ2 examined how climate-related information disclosed by CREs was distributed across the four disclosure pillars of NZ CS 1: Governance, Strategy, Risk Management, and Metrics and Targets. The analysis found an uneven pattern of thematic coverage across the 216 reports reviewed in 2024.

Strategy and Metrics and Targets were the most frequently reported pillars, appearing in 178 and 170 reports, respectively. Governance and Risk Management each appeared in 144 reports. At the thematic level, GHG emissions and reporting basis was the most frequently reported theme, followed by climate impacts and exposure and transition planning. Risk response and review appeared less often than the other themes. These findings indicate that climate-related disclosure under the NZ CS 1 framework was not evenly distributed during the first full mandatory reporting cycle.

The results contribute to the mandatory climate disclosure literature in three ways. First, RQ2 examines disclosure content and identifies which areas of the New Zealand climate reporting framework were more frequently visible in public reporting. This provides evidence from New Zealand's first full mandatory reporting cycle and responds to the need to understand how firms translate a general climate reporting framework into reporting content. RQ2 shows that research on mandatory climate reporting needs to consider not only the quantity of disclosure, but also its thematic composition.

Second, the evidence from RQ2 indicates that a common regulatory framework does not necessarily result in an even distribution of themes in corporate reports. NZ CS 1 provides a common structure for reporting climate-related risks and opportunities across its four pillars. The findings show, however, that themes within this structure appeared at different frequencies in the 2024 reporting corpus. This distinction contributes to the literature by separating the existence of a general disclosure architecture from the distribution of reporting themes. It also builds on earlier climate disclosure research showing that firms do not adopt or implement all climate-related reporting areas at the same pace or with the same emphasis (Auzepy *et al.*, 2023; Chua *et al.*, 2022).

Third, RQ2 makes a methodological contribution by translating the disclosure structure specified in NZ CS 1 into a coding framework for systematic thematic analysis. By dividing the four disclosure pillars into 12 themes, the study identifies and compares the occurrence of different themes in 2024 climate-related disclosures in a consistent way. The coding scheme retains the organisational logic of the regulatory framework while allowing the analysis to distinguish among different types of climate-related disclosure. In this way, the study systematically identifies and compares the document-level occurrence of themes in 2024 reports, rather than treating climate-related disclosure as a single and undifferentiated category. This approach is consistent with framework-based content analysis, which uses an existing framework to organise data and systematically code qualitative material (Fereday & Muir-Cochrane, 2006; Gale *et al.*, 2013).

The thematic pattern also supports a cautious theoretical interpretation. Institutional theory suggests that NZ CS 1–3 apply coercive pressure to CREs by requiring them to report climate-related information within a common regulatory framework (DiMaggio & Powell, 1983; Scott, 2014). Their reporting practices may also be shaped by normative pressures arising from professional standards, reporting guidance, and established conventions, as well as mimetic pressures associated with the reporting practices of other organisations (DiMaggio & Powell, 1983). These pressures may influence how CREs interpret the standards and translate the four pillars into public disclosures.

Legitimacy theory provides a complementary perspective. The four pillars of NZ CS 1 allow firms to communicate different aspects of their climate-related activities to external users, including organisational responsibilities, strategic responses, risk exposure, performance measurement, and future planning (Deegan, 2002; Suchman, 1995). The themes identified in the 2024 reports may therefore differ in their role in external communication. Some themes provide relatively direct ways for firms to explain their preparedness for, and response to, climate-related risks. Others involve more entity-specific processes that may be disclosed in different forms across firms.

Overall, RQ2 extends the analysis of mandatory climate reporting from disclosure extent to thematic content. It shows that NZ CS 1 provides a common reporting structure, while the themes that appear within that structure were unevenly distributed across reports in 2024. RQ2 provides empirical evidence on the thematic composition of early mandatory climate reporting, a systematic framework for examining the presence of 12 disclosure themes, and an account of how regulatory structure can coexist with variation in reporting content.

6.1.3 Changes in Disclosure Readability

The third contribution of this study is an empirical analysis of the readability of climate-related disclosure during the early implementation of mandatory climate reporting in New Zealand. Using evidence from 47 CREs, RQ3 examined whether the linguistic difficulty of climate-related disclosure changed between 2021 and 2024, and whether this change was associated with environmental performance and the post-adoption period. The results show that both CLI and DCRS generally increased during the study period, indicating greater textual difficulty.

The findings contribute to the climate disclosure literature in three ways. First, earlier studies have largely focused on the readability of annual reports and sustainability disclosures in voluntary settings (Lehavy *et al.*, 2011; Li, 2008; Loughran & McDonald, 2014). RQ3 extends this literature by examining readability during the early implementation of NZ CS 1–3. Within this sample, the climate-related disclosures became more difficult to read during this period, adding a textual-difficulty perspective to research on mandatory climate reporting.

Second, RQ3 helps interpret disclosure content within an emerging regulatory regime. NZ CS 1–3 require entities to explain matters relating to governance, strategy, climate-related risks and opportunities, risk management, and metrics (XRB, 2022b, 2022d). These topics often require specialised terminology and explanations of methodologies, estimates, and reporting judgements. The observed increases in CLI and DCRS are consistent with the possibility that early climate-related reporting contained more technical language. This interpretation is consistent with earlier accounting research suggesting that changes in reporting requirements may be accompanied by greater textual complexity (Efretuei *et al.*, 2022; Morunga & Bradbury, 2013; Richards & van Staden, 2015). RQ3 extends this discussion to climate-related disclosure and shows that textual difficulty is an important dimension of early mandatory reporting practice.

Third, RQ3 makes a methodological contribution by showing that readability should not be treated as a single, uniform textual property. CLI and DCRS capture different linguistic features. CLI is more sensitive to character-based word length and sentence structure, whereas DCRS places greater weight on sentence length and the proportion of difficult words (Coleman & Liau, 1975; Dale & Chall, 1948). The broadly consistent upward pattern in both measures across the policy period strengthens the conclusion that textual difficulty increased during the study period.

6.1.4 Practical Implications for Climate-related Disclosure

The findings also have practical implications for regulators, preparers and users of climate-related disclosure. This paper argues that extent, content, and readability all matter when assessing climate-related reporting practices.

For regulators and standard setters, the results provide an initial basis for assessing how the reporting regime operates. The expansion in disclosure extent and the shift towards standalone climate statements suggest that climate-related reporting has become more visible. However, the uneven distribution of thematic content and the lower readability of disclosures observed in the RQ3 sample indicate that visibility is only one aspect of effective reporting practice. Therefore, reviews of early climate statements could consider disclosure extent, the distribution of content across the NZ CS 1 framework, and the readability of narrative text.

The research findings also offer a structured approach for CREs to review their statements before publication. They can consider where climate-related information is presented, which themes are covered, and how the narrative is written. For example, a readability review at the final drafting stage could help reduce unnecessary repetition, overly long sentences, and unexplained technical terms.

For investors, lenders, and other users, the findings provide a broader basis for interpreting climate-related disclosures. Disclosure extent alone does not indicate reporting quality. A longer report may contain more climate-related information while still giving uneven attention to key themes or relying on difficult language. When assessing how a CRE identifies, manages, and responds to climate-related risks and opportunities, users can evaluate the extent of disclosure, the range of themes covered, and the readability of the narrative.

6.2 Limitations and Future Research

6.2.1 Research Design and Causal Inference

A key limitation of this thesis is the extent to which the research design can identify the effects of NZ CS 1–3. RQ1 and RQ3 compare climate-related disclosure before and during the early stage of standard implementation, while RQ2 examines the first full mandatory reporting cycle in 2024. As the study does not include an unaffected control group, the design does not establish that NZ CS 1–3 caused the observed changes. Changes in reporting practices, growing attention to climate risks, and industry-specific pressures may also have influenced disclosure extent, thematic content, and readability. Consequently, the study cannot separate the impact of NZ CS 1–3 from other contemporaneous changes.

Future research could address this limitation by incorporating control groups, extending the observation period, and examining evidence from other jurisdictions. A matched group of firms not subject to the same mandatory reporting requirements would provide a benchmark for assessing changes in the New Zealand corporate reporting environment. This would help determine whether the observed changes were specific to NZ CS 1–3 or reflected broader developments in corporate reporting. Extending the pre- and post-adoption observation periods would further strengthen the analysis by allowing researchers to assess existing disclosure trends and determine whether the observed changes persist as reporting practices mature. Evidence from other jurisdictions would provide an additional basis for distinguishing New Zealand-specific changes from broader developments in mandatory climate-related reporting. Together, these methods could support a more rigorous difference-in-differences design and provide stronger evidence on the effects of mandatory climate reporting.

6.2.2 Sample and Data Scope

The interpretation of the findings is also limited by the study period and sample scope. The analysis covers 2021 to 2024, meaning that RQ1 and RQ3 examine only the first two years of the early implementation of NZ CS 1–3. RQ2 focuses on 2024, the first full mandatory reporting cycle. The study captures an emerging reporting environment rather than a fully mature reporting practice. The final RQ3 sample is also narrower than the broader CRE population. It includes 178 firm-year observations from 47 firms and consists mainly of listed companies. Firms with incomplete reports or missing environmental performance data were excluded from the final regression sample. The readability findings and their associations with E_Score apply most directly to the data-available, predominantly listed sample and should not be generalised to all New Zealand CREs. The sensitivity analysis in Appendix D shows that some associations receive weaker statistical support when standard errors are clustered by firm. Findings close to conventional significance thresholds should therefore be interpreted cautiously.

Future research could address this limitation by extending the observation period and expanding the sample to include firms beyond the current dataset. Adding more reporting years would help researchers to examine whether patterns observed during the early implementation of NZ CS 1–3 persist as reporting practices mature. A broader sample would also improve the generalisability of the findings. Longer observation periods and wider samples would help distinguish temporary features of the first reporting cycles from more stable patterns in mandatory climate-related disclosure.

6.2.3 Keyword-based Construction of the Climate-related Corpus

The method used to construct the climate-related text corpus also presents certain limitations. This study used a pre-specified keyword-matching procedure to identify climate-related sentences in corporate reports and construct the corpus. This method provides a transparent and reproducible basis for analysing a large number of reports, particularly where climate-related information is dispersed across different documents (Bochkay *et al.*, 2023; Loughran & McDonald, 2016). However, the procedure may fail to identify passages that discuss climate-related matters without using the selected keywords. It may also capture sentences that contain climate-related keywords but provide only a brief reference rather than detailed climate information. Since the extracted corpus provides the basis for subsequent analyses, the selection of keywords may influence the disclosure extent measured in RQ1, the material available for thematic coding in RQ2, and the text used to calculate readability in RQ3.

Future research could address this limitation by combining keyword matching with manual validation or other text-analysis methods. Manual review of selected extracted and unextracted passages could help identify false positives and relevant passages omitted during the keyword extraction process. An expanded keyword dictionary and semantic classification methods may also improve the identification of climate-related language expressed through different terminology or entity-specific phrasing. Comparing the results of different corpus construction methods will help future research assess whether observed patterns in disclosure extent, thematic coverage, and readability remain stable when the underlying text corpus is defined differently.

Also, the thematic analysis was undertaken by a single coder, so agreement between independent coders was not assessed. The checks described in Section 3.4 were conducted by the same coder and therefore do not constitute an independent assessment of the coding (O'Connor & Joffe, 2020). Future research could use a second coder to independently code a subset of reports and compare coding decisions.

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Appendix A
Variable Definitions

Variable	Full Name	Source	Calculation
Dependent variables:			
CLI	Coleman-Liau Index	Climate-related disclosure text identified through the RQ1 extraction procedure.	Calculated in Python using *textstat*. Based on the average number of letters per 100 words and the average number of sentences per 100 words. Higher values indicate lower readability.
DCRS	Dale-Chall Readability Score	Climate-related disclosure text identified through the RQ1 extraction procedure.	Calculated in Python using textstat. Based on average sentence length and the proportion of words not on the Dale-Chall easy-word list. Higher values indicate greater reading difficulty. Scores of 10.0 and above are interpreted as indicating very difficult text, without extrapolating to specific educational grade levels.
Main explanatory variable:			
Policy	Pre vs. Post of NZ CS 1–3	Constructed from the reporting year	Indicator variable equal to 1 for firm-year observations in 2023–2024 and 0 for firm-year observations in 2021–2022. This variable captures the NZ CS 1–3 policy period of the New Zealand mandatory climate-reporting regime, which applies to financial years beginning on or after 1 January 2023.
Control Variables:			
E_Score	Environment performance	LSEG (Refinitiv)	LSEG aggregates category-level ESG measures into three pillar scores, including the environmental pillar, and normalises pillar scores to a 0–100 scale. Higher values indicate stronger relative environmental performance within the LSEG scoring framework.
Size	Company size	LSEG (Refinitiv); Financial statements	Total assets at the end of the year.
ROA	Profitability	LSEG (Refinitiv); Financial statements	Pre-tax Return on Assets.
LEV	Leverage	LSEG (Refinitiv); Financial statements	Ratio of debt to total assets.
Env_Sens	Environmental sensitivity of industry	Industry classification	Indicator variable equal to 1 if the firm is classified as operating in an environmentally sensitive industry, and 0 otherwise. In this study, environmentally sensitive industries include Utilities & Energy, Transportation, and Industrials.

Appendix B
Supplementary Panel Unit Root Tests

Before estimating the panel regressions, Fisher-type panel unit root tests were conducted for the main continuous variables used in the RQ3 analyses. The Fisher procedure applies a unit-root test to each panel separately and then combines the panel-specific p-values into an overall test statistic. This study reports the inverse chi-squared Fisher P statistic and its associated p-value. Under the null hypothesis, all panels contain unit roots. With a finite number of panels, rejecting the null does not imply that all panels are stationary; it only indicates that the unit-root null is not true for every panel.

The final regression sample is a short and unbalanced panel comprising 47 firms and 178 firm-year observations over 2021–2024 (See Section 3.5.2). Given the very short time dimension (T = 4) of the panel, adding one lag materially reduces the usable within-firm observations available for the panel-specific ADF regressions. Under the one-lag ADF specification, several panel-specific subtests were incomplete, and some combined Fisher statistics were unavailable. For this reason, Appendix Table B1 reports the zero-lag Fisher-type ADF and PP results as the main specification. This should be interpreted as a pragmatic choice for a very short panel, rather than as evidence that a zero-lag specification is generally preferable.

Table B1

Panel Unit Root Tests for the Main Continuous Variables

Variable	Fisher-ADF (P)	p-value	Fisher-PP (P)	p-value
CLI	588.31	<.001	588.31	<.001
DCRS	486.52	<.001	486.52	<.001
E_Score	441.29	<.001	441.29	<.001
Size	483.12	<.001	483.12	<.001
ROA	667.64	<.001	667.64	<.001
LEV	393.01	<.001	393.01	<.001

Note. Appendix Table B1 reports Fisher-type panel unit root tests for the main continuous variables used in the RQ3 regressions. *Policy* and *Env_Sens* are excluded because they are binary indicator variables. (P) denotes the inverse chi-squared Fisher statistic. The reported results are based on zero-lag Augmented Dickey-Fuller (ADF) and zero-lag Phillips-Perron (PP) tests. The sample comprises 178 firm-year observations across 47 firms for 2021–2024. See Appendix A for variable definitions.

Under the zero-lag specification, the ADF and PP procedures yielded identical combined Fisher statistics for the reported variables. This should not be interpreted as a general

equivalence between the two tests. Rather, it indicates that the panel-specific p-values entering the Fisher combination were identical, or numerically indistinguishable, under the present specification.

Appendix Table B1 shows that the reported inverse chi-squared statistics are all associated with p-values < .001. Following the standard decision rule, the null hypothesis that all panels contain unit roots is rejected when the reported p-value falls below the selected significance threshold. In the present case, all reported p-values are smaller than .001. Accordingly, the null hypothesis is rejected for CLI, DCRS, *E_Score*, *Size*, *ROA*, and *LEV*. These results indicate that the variables used in the subsequent regressions do not exhibit pervasive non-stationarity.

Appendix C
Supplementary Hausman Test Results

The Hausman specification test was used to compare the consistency of the random-effects (RE) and firm fixed-effects (FE) estimators. For both CLI and DCRS, the test statistics are non-significant, indicating that the random-effects estimator is preferred.

Table C1

Hausman Test Results for the Baseline Model

Dependent variable	χ^2(df)	p-value	Preferred estimator
CLI	2.26 (4)	0.6872	RE
DCRS	3.29 (4)	0.5111	RE

Note. Appendix table C1 reports Hausman test results for the baseline model. The test compares the fixed-effects and random-effects estimators for the retained baseline specification. A non-significant p-value indicates that the random-effects estimator is preferred. Because *Env_Sens* is time-invariant, it is not estimated in the fixed-effects specification.

Table C2

Hausman Test Results for the Interaction Model

Dependent variable	χ^2(df)	p-value	Preferred estimator
CLI	2.81 (5)	0.7298	RE
DCRS	3.33 (5)	0.6485	RE

Note. Appendix table C2 reports Hausman test results for the interaction model. The test compares the fixed-effects and random-effects estimators for the retained interaction specification, which adds the *E_Score* × *Policy* term to the baseline model. A non-significant p-value indicates that the random-effects estimator is preferred. *Env_Sens* is time-invariant over the sample period and is not estimated in the fixed-effects specification.

Appendix D
Firm-clustered Standard Errors

Tables D1–D4 present a sensitivity analysis of the specifications reported in Tables 4.6–4.9, respectively, using standard errors clustered at the firm level. The main analysis uses conventional, non-clustered standard errors. The sample and regressors are unchanged. Tables D1 and D2 report coefficients with clustered standard errors in parentheses. Tables D3 and D4 follow the coefficient-only presentation of Tables 4.8 and 4.9; their significance markers are based on clustered standard errors.

Table D1

Baseline Regression Results for Equation (1) with Firm-clustered Standard Errors

Variables	CLI	CLI	DCRS	DCRS
Policy	0.4004*	0.4778**	0.4326***	0.4191**
	(0.2206)	(0.2328)	(0.1630)	(0.1761)
E_Score	0.0015	-0.0001	0.0120*	0.0184
	(0.0072)	(0.0119)	(0.0064)	(0.0117)
Size	0.000065	-0.000031	-0.000046*	0.000028
	(0.000073)	(0.000315)	(0.000027)	(0.000116)
ROA	0.9920	2.6914	2.1212	3.4204*
	(1.7309)	(2.4653)	(1.3535)	(1.9785)
LEV	-0.6293	0.7494	-0.3104	0.6059
	(1.1388)	(2.7243)	(1.0399)	(1.7933)
Env_Sens	-0.0148	—	0.0686	—
	(0.5130)		(0.2517)	
Constant	15.4506***	15.4120***	13.8244***	13.0678***
	(0.4562)	(1.0753)	(0.3711)	(0.7970)
Observations	178	178	178	178
Firms	47	47	47	47
R-squared	0.0491	0.0490	0.0533	0.1343
Firm fixed effects	No	Yes	No	Yes

Note. Table D1 reports the specification in Table 4.6. Firm-clustered standard errors are reported in parentheses. The sample comprises 178 firm-year observations from 47 firms over 2021–2024. Higher CLI and DCRS values indicate lower readability. See Appendix A for variable definitions. Env_Sens is omitted from the FE models because it is time-invariant within firms. *, **, and *** indicate significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively.

Table D2

Interaction Regression Results for Equation (2) with Firm-clustered Standard Errors

Variables	CLI	CLI	DCRS	DCRS
Policy	1.2669***	1.3886***	0.7871**	0.7943**
	(0.4735)	(0.5037)	(0.3620)	(0.3895)
E_Score	0.0077	-0.0012	0.0146**	0.0180
	(0.0087)	(0.0132)	(0.0070)	(0.0116)
E_Score × Policy	-0.0231**	-0.0243**	-0.0094	-0.0100
	(0.0103)	(0.0107)	(0.0069)	(0.0074)
Size	0.000086	0.000036	-0.000038	0.000056
	(0.000074)	(0.000312)	(0.000027)	(0.000112)
ROA	0.6494	2.3759	1.9938	3.2905*
	(1.7010)	(2.3150)	(1.2896)	(1.8780)
LEV	-0.4649	1.3947	-0.2430	0.8716
	(1.1515)	(2.7313)	(1.0429)	(1.8287)
Env_Sens	-0.0833	—	0.0409	—
	(0.5190)		(0.2484)	
Constant	15.1453***	15.0629***	13.6960***	12.9240***
	(0.5104)	(1.1058)	(0.4192)	(0.8151)
Observations	178	178	178	178
Firms	47	47	47	47
R-squared	0.0701	0.0882	0.0599	0.1472
Firm fixed effects	No	Yes	No	Yes

Note. Table D2 reports the specification in Table 4.7, including E_Score × Policy. Firm-clustered standard errors are reported in parentheses. The sample comprises 178 firm-year observations from 47 firms over 2021–2024. Higher CLI and DCRS values indicate lower readability. See Appendix A for variable definitions. Env_Sens is omitted from the FE models because it is time-invariant within firms. *, **, and *** indicate significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively.

Table D3

Baseline Models with Report-type Controls and Firm-clustered Standard Errors

	CLI	CLI	DCRS	DCRS
Panel A: plus CS_Any				
Policy	0.2937	0.3493	0.4413***	0.4103**
E_Score	0.0025	-0.0005	0.0119*	0.0184
CS_Any	0.2642	0.3589	-0.0209	0.0248
Observations	178	178	178	178
Firms	47	47	47	47
Panel B: plus Multi_Report				
Policy	0.4458*	0.4945**	0.3261**	0.3279*
E_Score	0.0016	0.0001	0.0119*	0.0168
Multi_Report	-0.1091	-0.0453	0.2580	0.2461
Observations	178	178	178	178
Firms	47	47	47	47
Panel C: plus CS_Any and Multi_Report				
Policy	0.3620	0.4251*	0.3736**	0.3521**
E_Score	0.0037	0.0028	0.0108*	0.0158
CS_Any	0.5570*	0.7164*	-0.3108	-0.2494
Multi_Report	-0.4503	-0.5499	0.4495	0.4218
Observations	178	178	178	178
Firms	47	47	47	47
Firm fixed effects	No	Yes	No	Yes

Note. Table D3 reports the specifications in Table 4.8. Statistical significance is based on firm-clustered standard errors. The sample comprises 178 firm-year observations from 47 firms over 2021–2024. Higher CLI and DCRS values indicate lower readability. See Appendix A for variable definitions. CS_Any captures the presence of a standalone climate statement, and Multi_Report captures more than one retained report in the firm-year. All regressions include Size, ROA, LEV, and Env_Sens. The report-type controls do not change text extraction or the unweighted averaging of report-level readability scores. Env_Sens is omitted from the FE models because it is time-invariant within firms. *, **, and *** indicate significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively.

Table D4

Interaction Models with Report-type Controls and Firm-clustered Standard Errors

	CLI	CLI	DCRS	DCRS
Panel A: plus CS_Any				
Policy	1.1611**	1.2434**	0.8171**	0.7987**
E_Score	0.0080	-0.0014	0.0144**	0.0180
E_Score × Policy	-0.0223**	1	-0.0096	-0.0100
CS_Any	0.1886	0.2818	-0.0527	-0.0087
Observations	178	178	178	178
Firms	47	47	47	47
Panel B: plus Multi_Report				
Policy	1.4096***	1.4889***	0.6461*	0.6757*
E_Score	0.0081	-0.0001	0.0141**	0.0167
E_Score × Policy	-0.0244**	-0.0253**	-0.0081	-0.0088
Multi_Report	-0.2223	-0.1710	0.2206	0.2022
Observations	178	178	178	178
Firms	47	47	47	47
Panel C: plus CS_Any and Multi_Report				
Policy	1.3172***	1.4162***	0.7000**	0.7013*
E_Score	0.0099	0.0025	0.0130*	0.0158
E_Score × Policy	-0.0241**	-0.0252**	-0.0082	-0.0089
CS_Any	0.5425	0.7116*	-0.3156	-0.2511
Multi_Report	-0.5540	-0.6718*	0.4147	0.3789
Observations	178	178	178	178
Firms	47	47	47	47
Firm fixed effects	No	Yes	No	Yes

Note. Table D4 reports the specifications in Table 4.9, including E_Score × Policy. Statistical significance is based on firm-clustered standard errors. The sample comprises 178 firm-year observations from 47 firms over 2021–2024. Higher CLI and DCRS values indicate lower readability. See Appendix A for variable definitions. CS_Any captures the presence of a standalone climate statement, and Multi_Report captures more than one retained report in the firm-year. All regressions include Size, ROA, LEV, and Env_Sens. The report-type controls do not change text extraction or the unweighted averaging of report-level readability scores. Env_Sens is omitted from the FE models because it is time-invariant within firms. *, **, and *** indicate significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively.

For the baseline model in Table D1, the Policy coefficients retain positive signs and statistical

support. The CLI RE coefficient is significant at the 10 per cent level (p = .070), compared with the 5 per cent level under conventional standard errors. The CLI FE coefficient remains significant at the 5 per cent level (p = .046). The DCRS Policy coefficients remain significant in RE (p = .008) and FE (p = .022). The baseline E_Score association with DCRS receives weaker support: it is significant at the 10 per cent level in RE (p = .061) and is not significant in FE (p = .124).

Table D3 retains the distinction between the two readability measures observed in Table 4.8. The CLI RE Policy coefficient is not significant at the 10 per cent level when CS_Any is included, either alone or with Multi_Report. DCRS Policy coefficients remain positive and significant at the 5 per cent level except in the FE specification with Multi_Report alone (p = .060). Clustering does not uniformly reduce significance: for example, the CLI FE Policy coefficient with Multi_Report alone reaches the 5 per cent level (p = .043), compared with the 10 per cent level under conventional standard errors.

In Tables D2 and D4, the negative E_Score × Policy coefficients remain significant at the 5 per cent level for CLI, while the DCRS interactions remain insignificant. Some Policy coefficients have weaker support. In Table D4, the DCRS coefficients with Multi_Report alone are significant only at the 10 per cent level in RE (p = .055) and FE (p = .072); the FE coefficient with both report-type controls is also significant only at that level (p = .057). As in the main interaction models, Policy represents the period difference at E_Score = 0. The sensitivity check identifies changes in the precision of particular estimates; the fitted coefficients are unchanged.