

Climate Change Related Disclosure by Large Indian Companies - Pre and Post Business Responsibility Reporting and Paris Climate Accord

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Abstract

There is an increasing concern on the carbon bubble in the stock market valuation of companies those depend on fossil fuel based energy production. When countries ratify the global climate agreement, the industries which are the major contributors of climate change will be exposed to climate risk. Earth Summit of 1992, Kyoto Protocol of 1997(effective from 2005 to 2020) and Paris agreement of 2015 (effective from 2020) are the international agreements on climate change. Paris Agreement deals with greenhouse gas emissions mitigation, adaptation and finance emphasizing on consensus building, voluntary and nationally determined targets. Corporate all over the world, including India are voluntarily committing to the targets set by Paris Agreement. In India, SEBI has mandated Business Responsibility Reporting as national level Environmental, Social and Governance (ESG) reporting by corporate from FY 2012-13. India, being the fourth largest emitter of Greenhouse gas, it is interesting to measure the level of corporate climate change disclosure by large Indian companies and whether they have improved after introduction of Paris Climate Accord and introduction of BRR. Hence, this study measures the level of climate change disclosure by S&P Nifty 50 companies for 5 years from FY 2009-10 to FY 2016-17 using content analysis. By using NVivo software, keywords were searched from the contents of Annual Reports, Sustainability Reports & Integrated Reports. Using analysis of variance, this study found that there are significant company-wise, year-wise, sector-wise and category-wise (polluting Vs. non-polluting) differences in the level of climate change disclosure by large Indian companies. It is also found that there is a significant improvement before and after the implementation of Business Responsibility Reporting and introduction of Paris Climate Accord.

Keywords: *Environmental Disclosure, Climate Change Disclosure, Business Responsibility Reporting, Paris Agreement*

JEL Classification: Q5

1. Introduction

The increasing regulatory requirements, demand from stakeholders to report sustainability practices and the concern of the companies towards reporting attracted interest of the researchers in the area of environmental sustainability disclosure in the past decade. Firms globally are following the Sustainable Development Goals (SDG) by the United Nations, Global initiatives like Global Reporting Initiative (GRI), Principles for Responsible Investment (PRI), etc. Apart from these voluntary initiatives, there are country level regulations which mandate companies to report their sustainability performance. One such mandatory initiative in India is the Business Responsibility Reporting (BRR) which mandates reporting three central factors such as Environmental, Social and Governance (ESG) elements of business which measure the sustainability and ethical impact. This study attempts to measure the level of climate change disclosure by large Indian companies and to investigate whether a) the implementation of national level mandatory regulation, viz., BRR and b) the introduction of international agreement, viz., Paris Climate Agreement has improved their disclosure.

2. Review of Literature

2.1. Regulations/Agreements/Frameworks/Guidelines/Reporting on Climate Change

2.1.1. International Regulations of Climate Change

a) United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty adopted in the Earth Summit in Rio de Janeiro in 1992. The objective is to control the Greenhouse gas concentrations in the atmosphere. The framework sets non-binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. The framework outlines how specific international treaties (called "protocols" or "agreements") may be negotiated to specify further action towards the objective of the UNFCCC. There are two important agreements developed under this framework viz., a) Kyoto Protocol and b) Paris Climate Agreement.

b) Kyoto Protocol

Kyoto Protocol adopted in 1997 is an international agreement with an objective to commit countries by setting internationally binding emission reduction targets. The Kyoto Protocol is an important step towards a global emission reduction regime that would stabilize GHG emissions. It was entered into force in February 2005. A total of 192 parties including European Union have signed and ratified the Kyoto Protocol, this is the global level agreement to fight climate change which is in effect. To date, the only nations that haven't signed 1997's Global Climate Treaty are Andorra, Palestine and South Sudan. U.S.A had signed the treaty but not ratified. Canada had withdrawn its acceptance to its protocol. The first commitment period of Kyoto Protocol is from 2008 to 2012. Doha agreement in 2012, fixed second commitment period from 2013 to 2020. Kyoto Protocol (that lapses in 2020) is the existing climate change agreement that will be replaced by the Paris Agreement in 2020.

c) Paris Climate Agreement

The Paris Agreement is a global treaty to limit climate change, which was negotiated in

2015. After signing the agreement, the ratification of the Agreement takes place by competent authorities in each of these countries. Signing shows the 'intention' of countries to take steps to ratify the Agreement in due course. Unlike the signing process, which is open only until April 21, 2017, there is no specific deadline for ratification. As in March 2018, there are 197 signatories to the Paris Agreement and 175 countries ratified it. India signed and ratified both Kyoto Protocol and Paris agreement.

d) Climate Disclosure Project (CDP)

Carbon Disclosure Project(CDP) is an organisation based in the United Kingdom which supports companies and cities to disclose the environmental impact of major corporations. It aims to make environmental reporting and risk management a business norm, and drive disclosure, insight and action towards a sustainable economy. Companies all over the world report their climate related information through CDP.

e) Taskforce on Climate Related Financial Disclosure

Financial Stability Board (FSB) formed the Task Force on Climate related Financial Disclosures (TCFD) after G20 Finance Ministers and Central Bank Governors asked the FSB to convene public and private sector participants to review how the financial sector can take account of climate-related issues. In the course of its work, the TCFD reviewed existing disclosure frameworks, consulted with a wide range of stakeholders and tapped into the deep expertise of its members. In June 2017, the TCFD published its final report, "Recommendations of the Task Force on Climate-related Financial Disclosures" (TCFD Recommendations). The Recommendations has four themes such as governance, strategy, risk management, and metrics and targets. These overarching areas are supported by 11 specific disclosure recommendations.

2.1.2. Voluntary Guidelines and Mandatory Reporting Schemes In India

a) The National Voluntary Guidelines for the Social, Environmental and Economic Responsibilities of Business (NVGs)

The National Voluntary Guidelines for the Social, Environmental and Economic Responsibilities of Business (NVGs) was released by Ministry of Corporate Affairs in 2009. It is the product of an intensive multi-stakeholder collaboration spanning three years and involving contributions from a wide variety of stakeholders. The NVGs comprises of "9 Core Principles" which address different aspects of business responsibility (such as environmental, social and governance) and "48 Core Elements", which are included alongside the core principles to help guide businesses in adopting/integrating the NVGs into their operations. It advocates that businesses adopt a holistic triple bottom-line approach whereby financial performance can be harmonized with the expectations of society, the environment and the many stakeholders it interfaces in a sustainable manner.

b) Business Responsibility Reporting (BRR)

Business responsibility makes business to balance profit-making activities with activities that benefit society; it involves developing businesses with a positive relationship with the society in which they operate. Followed by growing attention towards ESG reporting by business, SEBI mandated BRR for top 100 BSE and NSE listed to disclose their Business

Responsibility Practices through a report adhering to the NVG framework. As per SEBI Regulation, 2015, the top five hundred listed entities based on market capitalization (as on March 31 of every financial year) are required to report BRR from FY 2016-17.

2.2. Studies Relating to International Regulations on Climate Change

Freedman & Jaggi (2005) measured the changes in level of pollution disclosure by companies from Kyoto protocol ratified countries compared to countries without ratification using an index having weighted and unweighted items. They found that firms from countries that ratified the Protocol have higher disclosure scores as compared to firms in other countries. Kolk et al. (2008) studied corporate responses to climate change in relation to the development of reporting mechanisms for greenhouse gases with special reference to carbon disclosure. The study found that CDP has been successfully using institutional investors to urge firms to disclose extensive information about their climate change activities. The study also found that carbon disclosure has achieved some progress in technical terms, but much less with regard to the cognitive and value dimensions.

Prado Lorenzo et. al. (2009) found that companies located in countries which have adopted or ratified the Kyoto Protocol, tend to stand out from the other companies by revealing a higher volume of information in addition to those indicators. Freedman and Jaggi (2010) studied the impact of Kyoto Protocol across countries and found that GHG disclosures are greater for Canadian and Japanese firms compared with firms from the EU countries and they also differ somewhat across EU firms. The study used data given by 282 firms in CDP questionnaire besides websites, annual reports, social, environmental and sustainability reports.

Freedman and Jaggi (2011) studied the relationship between the ratification of the Kyoto Protocol, greenhouse gas performance and greenhouse gas reporting. Using content analysis of disclosure done by firms belonging to various industries from Europe, Japan, Canada, India and USA and found that companies operating in a country that ratified the protocol tended to disclose more, with an exception of Indian companies. The study found no significant relationship between greenhouse gas emission performance and greenhouse gas disclosure. Gallego-Álvarez, et.al. (2011) studied companies from developed countries: the USA, Australia, Canada and the European Union and developing countries: China, India, Brazil, and Mexico and found that companies from countries that have ratified the Kyoto Protocol disclosed a higher volume of information on greenhouse gas emissions on their websites, compared to companies from countries which have not ratified it.

Berthelot & Robert (2011) found that Canadian oil and gas firms disclose very little climate change information. Mostly, they provide details on the regulation and disclose the impact of this regulation on their operations. Information about risk and strategies to manage GHG emissions is very rare and nothing is published about key performance drivers even though Canada has signed and ratified the Kyoto Protocol implies a tightening of requirements with respect to GHG emissions for oil and gas firms. Andrew and Cortese (2011) studied how dominant environmental discourses can influence and shape carbon disclosure regulation. The study considers both the construction of self-regulated carbon disclosure practices and the role that this kind of carbon information may have on climate change-related decision making with a focus on the Carbon Disclosure Project (CDP) and the use of the Greenhouse

Gas (GHG) Protocol as a reporting model within it. The study found that the methodological diversity underpinning carbon disclosures may inhibit the usefulness of climate change-related data.

Stanny (2013) examined voluntary disclosures about greenhouse gas emissions by the US S&P 500 firms to the Carbon Disclosure Project (CDP). Trends in three disclosures (answering the questionnaire, disclosing emissions and disclosing accounting methodology for emissions) are examined from 2006 to 2008. The frequencies of all three disclosures increased over this period. The study found that many firms answer the questionnaire, but do not disclose their emission amounts or how they account for them. It is consistent with a prediction from the legitimacy theory literature that firms will disclose the minimum to avoid scrutiny.

Eccles & Krzus (2017) studied the disclosures of 15 of the largest oil & gas companies in the United States from the Perspective of the Task Force on Climate-related Financial Disclosures. The study was conducted with an assumption that it would be more feasible to implement the TCFD's recommendations if companies were already doing a reasonable amount of disclosure than having very lesser disclosure. Kouloukoui, D. et al. (2018) opined that climate change risk disclosure is becoming a focus of research recently with the introduction of Paris agreement in 2015 and especially after the release of FSB Task Force on Climate-related Financial Disclosures (TCFD) recommendations in 2017.

2.3. Studies Relating to Country Specific Regulations

Stolaroff et al. (2009) studied the US Environmental Protection Agency's (EPA) proposed Mandatory Reporting of Greenhouse Gases rule in 2009 and suggested a number of improvements to the rule to enhance compatibility with expected future climate legislation and enable a broader range of policies and analysis. Brouhle and Harrington (2010) studied the decision of firms to participate in the Canadian Climate Change Voluntary Challenge and Registry Program (VCR) and found that firms may participate in VCR to signal their environmental responsibility to regulators and to some extent investors, but not to consumers.

Lodhia and Martin (2011) studied the submissions made on the National Greenhouse and Energy Reporting (NGER) policy paper by corporations and other stakeholders and found a divergence in the responses of corporations and other stakeholders, with the former focusing primarily on the NGER policy paper, while the latter presented significant concerns over carbon pollution and climate change, an issue that was not the primary concern of the policy paper. The study applied a combination of concept analysis and mapping using the Leximancer software tool.

Qian, W (2012) studied the carbon efficiency of corporations registered under the Australian National Greenhouse and Energy Reporting (NGER) Act 2007 and found that carbon efficiency results vary significantly between industries and scopes of emissions. Kauffmann and Less (2012) analysed the domestic GHG emission reporting schemes of the UK, France, Japan and Australia [as part of a project with United Nations Conference on Trade and Development; the Climate Disclosure Standards Board; and the Global Reporting Initiative] and described the drivers and challenges for governments, companies and investors in dealing with GHG reporting.

Taurigana and Chithambo (2015) developed an index with information derived from several

GHG reporting frameworks and the sample comprises 215 companies from a population of London Stock Exchange FTSE 350 companies over four years (2008-2011). The study found that the publication of the 2009 guidance has had a significant effect on the level of GHG disclosure.

2.4. Studies Relating to Corporate Disclosure on Climate Change

Aerts et al. (2008) measured environmental disclosure of 267 European firms operate in the different industries, using a coding instrument. Rankin et al (2011) studied the voluntary corporate greenhouse gas (GHG) reporting by Australian firms in the context of a market governance system in the absence of climate change public policy using institutional governance theory. The study found that firms that voluntarily disclose GHGs have environmental management systems (uncertified and certified), higher corporate governance quality and publicly report to the CDP, tend to be large and in the energy and mining and industrial sectors. Ieng Chu et al. (2012) studied factors driving greenhouse gas reporting by top 100 A-share of Chinese companies during 2010 using content analysis of annual reports and corporate social responsibility (CSR) reports. The study found that most Chinese companies reported neutral and good news. Larger companies operating in an industry which has higher level of carbon dioxide emissions tend to have higher levels of greenhouse gas disclosures.

de Aguiar and Fearfull (2010) suggested a practical exercise using Global Climate Change (GCC) disclosure to develop students' critical accounting perspectives and suggested a checklist to analyse GCC disclosure. This checklist was developed from our examination of relevant literature on GCC. Haigh and Shapiro (2011) using primary data collected from functionaries of investment banking from USA, Europe and Australia found that environmental investing is conditioned by four factors: exclusion of carbon emissions in constructions of firm value; diverse methods used by firms to calculate, measure and report carbon emissions; the appropriate venue for such reporting; and the quantum of data contained therein. Yu and Ting (2012) found that for countries with higher financial development, companies are more willing to commit to carbon disclosure and was earmarking Climate Disclosure Leadership Index (CDLI) score for India well below most of the developed and developing countries.

Chatterjee (2012), using content analysis, identified the factors associated with variability and unevenness of reporting content against the indicators determined by the ISO 14064 standard. Borghei and Zahra (2013) measured GHG voluntary disclosure of non-GHG registered Australian companies using content analysis method from 2009 to 2011. Kouloukoui et al. (2018) studied the climate risk information disclosure by the world's largest companies and found that studies on climate risk disclosure are rare. Information disclosed on climate change is not mutually exclusive to that of disclosed on climate risks. Climate change information encompasses all data and is, therefore, more generic. On the other hand, climate risk data is more specific, referring to a set of information about threats linked to climate change and the strategies developed by companies to mitigate them.

3. Research Gap

The business response to the global climate regulations is an area less explored. Studies are

available on the influence of international regulations/framework/agreements on climate change disclosure by corporate in developed countries. Though developing countries have signed and ratified international regulations such as Kyoto Protocol and Paris Climate Accord, no research study has been done to analyse the influence of such regulations on corporate disclosure on climate change. In India, though sporadic research studies are available on the corporate environmental disclosure, no specific studies are available which measure the level of climate change disclosure. Again, no studies have been done to understand the change in the level of climate change disclosure pre and post introduction of BRR and Paris Climate Accord. Hence, this study tries to fill these gaps.

4. Statement of the Problem

India, being the third largest emitter of CO₂, has signed a) Kyoto Protocol with no binding on emission targets and b) Paris Climate Accord. But, India did not introduce any specific regulations on climate change. However, it introduced environmental related reporting schemes for corporate, viz., National Voluntary Guidelines on Environmental, Social and Governance issued by Ministry of Corporate Affairs, Government of India in 2009 and Business Responsibility Reporting mandated by Securities Exchange Board of India (SEBI) in 2012. In the light of the above, this study attempts to measure the level of climate change disclosure by large Indian companies and to investigate whether a) implementation of national level mandatory reporting, viz., BRR and b) introduction of international agreement, viz., Paris Climate Accord, has improved their disclosure.

5. Objectives of the Study

- 1) To measure the level of climate change related disclosure by large Indian companies.
- 2) To understand the change in the level of climate change disclosure by large Indian companies between pre and post implementation of BRR. Indian
- 3) To understand the change in the level of climate change disclosure by large Indian companies before and after the introduction of Paris Climate Accord. Indian

6. Hypotheses

This study tests the following null hypotheses:

- H01:** There is no significant company-wise difference in the climate change related disclosure by large Indian companies during the study period.
- H02:** There is no significant year-wise difference in climate change related disclosure by large Indian companies during the study period.
- H03:** There is no significant sector-wise difference in the climate change related disclosure by large Indian companies during the study period.
- H04:** During the study period, there is no significant difference in the climate change related disclosure by large Indian companies which belong to polluting sector and non-polluting sectors.
- H05:** There is no significant difference in the climate change related disclosure by large Indian companies before and after the implementation of Business Responsibility Reporting (BRR).

H06: There is no significant difference in the climate change related disclosure by large Indian companies before and after the introduction of Paris Climate Accord

7. Research Methodology

This is an analytical study. It used secondary data. The secondary data are collected from Annual Reports, Sustainability Report and Integrated Reports of the large Indian companies.

For collecting data, content analysis is the method used. Content analysis is a very popular method to analyse and compare sustainability reporting of the companies (Fifka, 2012). For the study purpose, the key words relating to climate change are identified. Keywords such as 'Climate Change', 'Greenhouse Gas', 'GHG', 'Climate Change Mitigation', 'CO2 Emission', 'Carbon Emission', 'Emission' were identified as more frequently used keywords in climate change related disclosure. Cowan and Gadenne (2005), Mahadeo et al. (2011) and Suttipun (2012) have used word as a unit of measurement in content analysis to determine level of environmental disclosure in annual reports. Campbell (2004) also justified the use of words as a unit of measurement, because it provides a greater amount of detailed description. Moreover, the application of words in business research allows the analysis to be more precise and defined upon identification of the subject matter being sought (Ahmad 2004).

In this study, the keywords were counted by automated content analysis using QSR NVivo Software. The word count was used to measure the level of climate change disclosure in the annual reports, sustainability reports and integrated reports. Word count results were received in the form of a frequency of the word count of different terms.

Table 1 Details of Sample

<i>Pollution Category</i>	<i>Sector</i>	<i>No. of companies</i>	<i>Percentage</i>
Polluting	Basic Materials	5	10%
	Consumer Goods	8	16%
	Health Care	5	10%
	Industrials	5	10%
	Oil & Gas	7	14%
	Utilities	2	4%
Non Polluting	Financials	10	20%
	Technology	8	16%
Total		50	100%

Source: www.nseindia.com

The sample for this study includes S & P Nifty 50 Indexed companies as on January 2, 2018. The companies were categorized into 7 broad sectors such as Basic Materials, Consumer Goods, Financials, Health Care, Industrials, Oil & Gas and Technology as per Industry Classification Benchmark. The study also attempts to study the differences in disclosure practices by companies belongs to more carbon intensive sectors and less carbon intensive sectors. Sectors such as technology and financials were categorised as non-polluting sectors and sectors such

as Industrials, Basic Materials, Consumer Goods, Utilities and Health Care were categorised as polluting sectors. The details of sample are given in Table 1. The details of the companies are given in Annexure.

The period of the study is 8 years, ranging from FY 2009-10 to FY 2016-17. With S&P Nifty 50 companies (as on January 2, 2018) as sample and eight years as study period, the total number of data points should be 400. Due to non-availability of data, the effective total number of data points worked out to be 386.

This study used Analysis of Variance (ANOVA), to find whether there are significant company-wise, year-wise, sector-wise and category-wise (polluting vs. non-polluting) differences in climate change related disclosure during the study period. Paired T sample test is used to understand the change in the level of climate changes related disclosure by large Indian companies before and after implementation of BRR and introduction of Paris Agreement. QSR NVivo software is used to collect word frequency data from reports using keywords. To analyse the data, Software Package for Social Sciences (SPSS 25.0) is used.

8. Results and Discussions

Table 2: Distribution of Keywords Across Different Reports of Large Indian Companies During the Study Period

	<i>Annual Reports</i>	<i>Sustainability Reports</i>	<i>Integrated Reports</i>	<i>Total</i>
2010	151	287	-	438
2011	156	209	-	365
2012	238	396	-	634
2013	241	415	-	656
2014	336	653	-	989
2015	365	754	-	1119
2016	496	666	27	1189
2017	533	523	110	1166

Note: Results computed using NVivo software

Table 2 gives distribution of climate change related keywords across different report of large Indian companies during the study period. An increasing trend in usage of keywords in Annual Reports shows that companies are incorporating climate related disclosure along with their financial reports. Apart from Annual Reports, Sustainability Reports have gained momentum and hence the presence of larger number of keywords from 2010 to 2016. During, 2016 and 2017 climate change related disclosure was made through Integrated Reporting by few companies such as Mahindra and Mahindra Ltd., Tata Steel Ltd, and Reliance Industries Ltd. Thus, the general increasing trend (figure 1) in the level climate change related disclosure may be attributed to ratification of Kyoto Protocol and Paris Climate Accord by India and implementation of financial reporting scheme, Viz., BRR for corporate in India.

Table - 3: Descriptive Statistics - Climate Change Related Keywords

<i>Keywords</i>	<i>Min</i>	<i>Maxi</i>	<i>Mean</i>	<i>SD</i>
Climate Change	.00	68.00	7.5285	12.10755
Greenhouse Gas	.00	18.00	1.8834	3.28466
Emission	.00	110.00	7.2772	11.23207
Climate Change Mitigation	.00	8.00	.3731	1.10286
CO2 Emission	.00	15.00	.8705	2.13415
Carbon Emission	.00	11.00	.3912	1.21455
Total Climate Change Related Words	.00	172.00	18.3238	24.95255

Valid N (listwise) = 386

Source: Annual Reports, Sustainability Reports, Integrated Reports of S&P Nifty 50 indexed Companies

Note: Results computed using SPSS 25

Table 3 shows descriptive statistics of climate change related keywords. The number of maximum keywords used is 172 by Tata Motors. The keyword 'Emission' is the mostly used and followed by the keyword 'Climate Change'. The keyword 'Climate Change Mitigation' is the least used one. Thus, it can be concluded that large Indian companies are aware about climate change risk and least proactive in mitigating the same.

Table - 4: Year-wise Descriptive Statistics for Climate Change Related Keywords

<i>Year</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>SD</i>
2009-10	42	.00	80.00	10.6667	19.08091
2010-11	49	.00	76.00	7.3469	13.93669
2011-12	48	.00	78.00	12.9792	20.20795
2012-13	49	.00	72.00	13.9184	18.24239
2013-14	50	.00	111.00	23.0800	27.37557
2014-15	50	.00	107.00	26.1000	27.60823
2015-16	50	.00	98.00	25.8800	26.23103
2016-17	48	.00	172.00	25.1458	33.44668

Valid N (listwise) = 42

Source: Annual Reports, Sustainability Reports, Integrated Reports of S&P Nifty 50 indexed Companies7

Note: Results computed using SPSS 25

Table 4 shows year-wise descriptive statistics for climate change related keywords. It is clear that during the initial study period, level of disclosure is low and it has started increasing from 2013-14 onwards. The slight reduction in the number of keywords during 2014-15 and 2015-16 may be attributed to the adoption of sustainability reporting and integrated reporting. Thus, it can be concluded that large Indian companies are taking efforts to understand the climate change related risk in recent years with regulatory reporting regime (BRR).

Table - 5 Results of ANOVA - Company-wise

	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Between Companies	144343.346	49	2945.783	10.378	.000
Within Companies	95369.175	336	283.837		
Total	239712.521	385			

Note: Result computed using SPSS 25.0

Table 5 gives the results of ANOVA for company-wise difference. As the p-value is less than 0.01, the null hypothesis, H01, is rejected at 1% level of significance. Thus, there is significant company-wise difference in climate change related disclosure among the large Indian companies during the study period.

Table - 6 Results of ANOVA - Year-wise

	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Between Years	19931.994	7	2847.428	4.897	.000
Within Years	219780.527	378	581.430		
Total	239712.521	385			

Note: Result computed using SPSS 25.0

Table 6 gives the results of ANOVA for year-wise difference. As the p-value is less than 0.01, the null hypothesis, H02, is rejected at 1% level of significance. Thus, there is significant year-wise difference in climate change related disclosure among the large Indian companies during the study period.

Table - 7: Results of ANOVA - Sector-wise

	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Between Sectors	30052.704	7	4293.243	7.740	.000
Within Sectors	209659.816	378	554.656		
Total	239712.521	385			

Note: Result computed using SPSS 25.0

Table 7 gives the results of ANOVA for sector-wise difference. As the p-value is less than 0.01, the null hypothesis, H03, is rejected at 1% level of significance. Thus, there is significant sector-wise difference in climate change related disclosure among the large Indian companies during the study period.

Table - 8: Results of ANOVA - Category-wise (Polluting and Non Polluting Industries)

	Sum of Squares	df	Mean Square	F	Sig.
Between Industries	3678.640	1	3678.640	5.985	.015
Within Industries	236033.881	384	614.672		
Total	239712.521	385			

Note: Result computed using SPSS 25.0

Table 8 gives the results of ANOVA for category-wise difference. As the p-value is less than 0.05, the null hypothesis, H04, is rejected at 5% level of significance. Thus, there is significant difference in climate change related disclosure among the large Indian companies which belong to polluting and non-polluting industries during the study period.

Table - 9: Results of Paired Samples T Test -Pre and Post BRR Climate Change Related Disclosure Differences

Pair	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre_BRR - Post_BRR	-5.80576	27.07662	2.29661	-10.34685	-1.26466	-2.528	138	.013

Note: Result computed using SPSS 25.0

Table 9 gives the results of Paired Samples T Test on changes in the level of climate change related disclosure before and after the implementation of BRR. As the p-value is less than 0.05, the null hypothesis, H05, is rejected at 5% level of significance. Thus, there is significant difference in the level of climate change related disclosure among large Indian companies before and after the implementation of Business Responsibility Reporting. The level of climate change related disclosure by large Indian companies increased after the implementation of BRR.

Table - 10: Results of Paired Samples T Test - Climate Change Related Disclosure Differences Before and After Introduction of Paris Climate Accord (PCA)

Pair	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Before PCA - After PCA	-16.47959	29.04644	2.93413	-22.30303	-10.65615	-5.617	97	.000

Note: Result computed using SPSS 25.0

Table 10 gives the results on Paired Samples T Test on changes in the level of climate change related disclosure before and after the introduction of Paris Climate Accord. As the p-value is less than 0.01, the null hypothesis, H_0 , is rejected at 1% level of significance. Thus, there is significant difference in the level of climate change related disclosure among large Indian companies before and after the introduction of Paris Climate Accord. The level of climate change related disclosure by large Indian companies increased after the introduction of Paris Climate Accord.

9. Findings of the Study

- 1) There is an increasing trend in the level of climate change related disclosure by large Indian companies, in terms of keywords present across various reports during the study period.
- 2) Large Indian companies are taking efforts to understand the climate change related risk in recent years with regulatory reporting regime (BRR) and introduction of Paris Climate Agreement.
- 3) There are significant company-wise, year-wise and sector-wise differences in the level of climate change related disclosures by large Indian companies during the study period.
- 4) There is a significant difference in the level of climate change related disclosures by large Indian companies which belong to polluting and non-polluting industries during the study period.
- 5) There is a significant increase in the level of climate change related disclosures by large Indian companies after the implementation of BRR.
- 6) There is a significant increase in the level of climate change related disclosures by large Indian companies after the introduction Paris Climate Accord.

10. Limitations of the Study

Following are the limitations of the study:

- 1) The limitations of the secondary data are applicable to this study.
- 2) Limitations of content analysis using keywords is applicable to this study.

11. Scope for Future Research

This study has measured the level of climate change related disclosures by S&P Nifty 50 companies. Future studies may be taken up in the following areas:

- a) Only word count based data are collected and used in the study. Hence, other parameters like number of sentences, number of pages, number of lines, etc., may be considered for future studies.
- b) As BRR is mandated for top 500 companies listed both in BSE and NSE. Hence, future studies can be tried with this sample.

12. Conclusion

Large Indian companies are increasingly disclosing climate change related matters due to the impact of global developments in the climate change mitigation actions like Paris Agreement and country level mandatory ESG reporting regulations like BRR. India, as one of the largest

GHG emitters, is prone to the effects of climate change risk. Adoption of Paris Climate Accord, Adoption of BRR by top 500 companies, increasing attention given by stakeholders on ESG performance and adoption of integrated reporting practice had compelled large Indian companies to disclose more information relating to climate change risk than ever before.

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Annexure

Sample Companies - S&P Nifty 50 Index (As on January 2, 2018)

SI No.	Industrial Sector	SI No.	Company Name	NSE Code
1	Basic Materials	1	UPL Ltd.	UPL
		2	UltraTech Cement Ltd.	ULTRACEMCO
		3	Tata Steel Ltd.	TATASTEEL
		4	Ambuja Cements Ltd.	AMBUJACEM
		5	Adani Ports and Special Economic Zone Ltd.	ADANIPTS

<i>Sl No.</i>	<i>Industrial Sector</i>	<i>Sl No.</i>	<i>Company Name</i>	<i>NSE Code</i>
2	Consumer Goods	6	Tata Motors Ltd.	TATAMOTORS
		7	Maruti Suzuki India Ltd.	MARUTI
		8	Mahindra and Mahindra Ltd.	M&M
		9	ITC Ltd.	ITC
		10	Hindustan Unilever Ltd.	HINDUNILVR
		11	Hero Motocorp Ltd.	HEROMOTOCO
		12	Eicher Motors Ltd.	EICHERMOT
		13	Bajaj Auto Ltd.	BAJAJ-AUTO
3	Financials	14	Yes Bank Ltd.	YESBANK
		15	State Bank of India	SBIN
		16	Kotak Mahindra Bank Ltd.	KOTAKBANK
		17	IndusInd Bank Ltd.	INDUSINDBK
		18	ICICI Bank Ltd.	ICICIBANK
		19	Indiabulls Housing Finance Ltd.	IBULHSGFIN
		20	HDFC Bank Ltd.	HDFCBANK
		21	Housing Development Finance Corporation Ltd.	HDFC
		22	Bajaj Finance Ltd.	BAJFINANCE
		23	Axis Bank Ltd.	AXISBANK
4	Health Care	24	Sun Pharmaceutical Industries Ltd.	SUNPHARMA
		25	Lupin Ltd.	LUPIN
		26	Dr Reddys Laboratories Ltd.	DRREDDY
		27	Cipla Ltd.	CIPLA
		28	Aurobindo Pharma Ltd.	AUROPHARMA
5	Industrials	29	Reliance Industries Ltd.	RELIANCE
		30	Larsen & Toubro Ltd.	LT
		31	Hindalco Industries Ltd.	HINDALCO
		32	Bosch Ltd.	BOSCHLTD
		33	Asian Paints Ltd.	ASIANPAINT
6	Oil & Gas	34	Vedanta Ltd.	VEDL
		35	Oil and Natural Gas Corporation Ltd.	ONGC
		36	Indian Oil Corporation Ltd.	IOC
		37	Hindustan Petroleum Corporation Ltd.	HPCL
		38	GAIL India Ltd.	GAIL
		39	Coal India Ltd.	COALINDIA
		40	Bharat Petroleum Corporation Ltd.	BPCL
7	Technology	41	Zee Entertainment Enterprises Ltd.	ZEEL
		42	Wipro Ltd.	WIPRO
		43	Tech Mahindra Ltd.	TECHM
		44	Tata Consultancy Services Ltd.	TCS
		45	Infosys Ltd.	INFY
		46	Bharti Infratel Ltd.	INFRATEL
		47	HCL Technologies Ltd.	HCLTECH
		48	Bharti Airtel Ltd.	BHARTIARTL
8	Utilities	49	Power Grid Corporation of India Ltd.	POWERGRID
		50	NTPC Ltd.	NTPC