Section A-Research paper

Does Carbon Emission Disclosures Practices Affect The Value of Firms -A Study of Select Manufacturing Firms in India

*Dr. K.R. Gola
Assistant Professor
Sharda University

**Dr. Mridul Dharwal
Professor
Sharda University

***Dr. Nimmi Agarwal
Associate Professor
Sharda University

****Ms. Shruti Ranjan
Research Scholar
Sharda University

Abstract

The main goal of today's world is to achieve the goal of sustainable development by preserving the environmentand it is one of the major measures in this direction isto reduce the emission of greenhouse gases.Carbon emission reduction, corporate carbon information disclosure (CID) has been an essential measure to attain carbon emission reduction globally.Thestudy examinsthe relationship ofVolume of carbon emission,Carbon Management Practice disclosure and Carbon emission disclosure with the value of the firm in India. The study uses data from 50 manufacturing companies from Nifty 100 listed. The relevant data for the period of three financial years 2019-2021 was extracted from CMIE ProwessIQ, annual and sustainability report of the companies. The data is analyzed using multiple regression with the help of SPSS. The criteria for the sample used are: companies Listed in Nifty, publish the annual report and sustainability report in 2019-2021, and as well as companies that implicitly or explicitly disclose carbon emissions. Volume of Carbon Emission which is measured by content analysis to find the amount of volume of carbon emission.

Firm's value is measured by net profit margin and return of assets. This research was adapted the CDP Questionnaires which has 18 items. Disclosure of Carbon Management Practice is measured by scoring, by giving maximum score is 18 and the minimum score is 0.The result of the study indicates that cabon emission disclosure has an insignificant impact on firms' Net profit margin and and Return on assets. We find that Volume of carbon emission was not related to Firm value while carbon management practicehavesignificantrelationship with Firm value.

Key Words – Carbon management practice,carbon emission disclosure, volume of carbon emission, sustainbility reporting, Net prifit margin and return on assets.

Introduction

The firm should have more proactive strategy to prevent carbon emissin instead of reducing carbon emission. We need to encourage and bring private and public sectors to move immediately and put into action on both mitigation and adaptation. This action will get impact and stimulate the market for generating more investment to achieve sustainable energy in the future(Y A Sudibyo, 2018) . It is in this endeavor that carbon trading is an innovative concept, which is currently very popular. 'Inter-change carbon trade' is a misleading term under which countries trade in similar technologies or units, under which the emission of green gases can be reduced over a certain period of time. A certificate obtained by the various countries or companies of the world under the Carbon Market for the reduction of emission of greenhouse gases, which is Certified Emission Reduction-CER or Carbon Credit. Companies that have achieved carbon offset targets through reductions in greenhouse gases will receive carbon credits if they make additional cuts.One unit in carbon credit will equal one ton of carbon dioxide (CO2) or carbon dioxide equivalent (CO2e).Green Accounting guides the stakeholders in how taking into account the environmental factors can be a means for sustainability (Pearce, Hamilton and Atkinson, 1996). It intends to discover how significant it is for an organization to actualize green accounting and monitor what it is accepting from the environment and what it is giving back consequently. The duty towards the environment has turned out to be the most significant factor in the corporate social responsibility of a firm (InfoCat, 2017). The significance of doing this research is first, there is increasing awareness regarding environmental issues, so that company have the consideration for disclosing carbon emission(Tang Q & Lan Y C, 2013)

Mechanism of Carbon Market

Under the Paris Agreement, most of the countries of the world have targeted to cut global greenhouse gas emissions, but to achieve these goals, it is not necessary to reduce emissions. Doing so can be a hindrance to economic development.In such a situation, the carbon market is a better option. For example, if a developed country fails to achieve its emission reduction goals, it can help a developing country to reduce the emission of greenhouse gases by transferring its funds or technology. In this way the said country can get carbon credits.Because these carbon credits are salable, a company or country can buy it and present it as a reduction in emissions by itself.Although the provision of the carbon market was also made in the Kyoto Protocol, the Paris Agreement, will have changes to some of its provisions and will also enhance the monitoring and investigation process.(paris climate agreement, 2021) Reduction in green house

gas emission and helpful in source of revenue for developing nations. Carbon market supports a free market mechanism and impetus for alternative sources of energy or green technology.

Need and Importance of the Study

Why are transparency and reporting of carbon emissions so crucial? The necessity for investors to examine the company's environmental risk is one of the causes. This means that information is necessary for investors to evaluate the company's efforts to safeguard the environment and pursue sustainable growth. In order for the investor to make better decisions regarding their portfolio. (Haigh & Shapiro, 2012)The businesses should try to set aside a portion of money for environmental safety and stability (Gola, 2022)The rationale behind naming carbon trading is that CO2 is the dominant green gas and other greenhouse gases are measured equivalent to CO2. Sustainability reporting is becoming a crucial component of global action that must take into account environmental and social issues. Because of this, it is also necessary to take into account the policies, rules, standards, and other tools, and should have encouraged businesses to report it(Malan,2016).

Literature Review

Hermawan et al., (2018) connects carbon emission disclosure with firm size and profitability. The sample of the paper is the listed manufacturing companies of Indonesian stock exchange for the period between 2014-16. The paper uses multiple regression analysis and collects the data from the secondary sources such as sustaianbilit and financial report of the companies. The findings of the study indicates that institutional ownership has no impact on carbon emission disclosure, but that the regulator, firm size, and profitability all have an ffective impact on this CED.The CED has its influence in the corporate real estate sector of Malaysia and the analysis is done by SEM. This finding has the implication that greater public understanding and education will benefits the companies to disclose more information, and companies will respond by doing so. Companies will also be motivated to disclose more information as financial institutions view sustainability as a financing cost and term for credit financing (Kalu et al 2016).Hardiyansah et al.,(2021) has analyzed 82 companies listed in Indonesia stock exchange by taking environmental performance and industry type as moderating variables. The findings demonstrates that disclosing carbon emissions had a favourable and significant impact on a

company's value. It is because disclosing carbon emissions is a form of corporate environmental concern that is well received by the market and serves as the foundation for investors' evaluations of a company's sustainability. Karim et al.,(2021) provides a different angle on carbon emission disclosure for UK firms. The study presents a better carbon emission disclosure measurement that accurately reflects the level of actual carbon emissions and the level of true ESG score. Capital spending and carbon emission disclosure have a strong positive association. Also, there is a direct relation between capital expenditure and carbon emission level.

Bebbington, J., & Larrinaga-Gonzalez, C. (2008). Carbon trading: accounting and reporting issues. The impact of carbon market has financial implication on firms in the future due to their effect of putting a price on the things that are usually free. The paper has a scientific and policy introduction to GCC because of the considerable impact of carbon market. The paper shows the issues related with the calculation of pollution allowance as it is described as an asset and if it goes above a certain level it is considered to be liability. A discussion of non-fiscal accounting and carbon reporting has risen due to the GCC closer inspection initiative.Kolk, A., Levy, D., & Pinkse, J. (2008). Corporate responses in an emerging climate regime: The institutionalization and commensuration of carbon disclosure. The reporting of carbon disclosure is discussed in the paper with respect to the response of companies towards the change in climate. The paper initially shows the trading and disclosure of carbon, and further by the use of different theories such as global governance, institutional theory and the emerging climate change to discuss the disclosure of carbon. Carbon Disclosure Project (CDP) gives a better view of disclosure and reporting of carbon. The analysis shows that CDP is helpful in utilising institutional investors to work for the disclosure of climate change activities by the firms. However, the level of carbon disclosure and its accounting as discussed by CDP is of any use for the investors but still the number of disclosure responding firm is increasing. The disclosure of carbon has some technical term development but it lacks in value and analytical dimension.

Andrew, J., & Cortese, C. (2011, September).Accounting for climate change and the self-regulation of carbon disclosures.The paper shows ‘critical dialogic engagement’ and explains the importance of environmental disclosure and its impact on regulation of carbon disclosure. Most of the carbon disclosures are voluntary and have increased in the past five years. The paper focus on the importance of carbon disclosure on the decision related to climate change and also on the formulation of practices of self regulated carbon disclosure. The initial discovery shows the use

of the data related to climate change may have restrained due to the diversified structure of carbon disclosure. The paper is based on Carbon Disclosure Project (CDP) and Greenhouse Gas (GHG) protocol to resolve the issues.Narassimhan, E., Gallagher, K. S., Koester, S., &Alejo, J. R. (2018). Carbon pricing in practice: A review of existing emissions trading systems. *Climate Policy*. The study shows the implementation of emissions trading systems (ETSs) in eight different jurisdictions: the EU, Switzerland, the Regional Greenhouse Gas Initiative (RGGI) and California in the US, Québec in Canada, New Zealand, the Republic of Korea and pilot schemes in China. The article explains the working and non working practices of ETS. All the eight ETS are evaluated on the basis of these criteria: environmental effectiveness, economic efficiency, market management, revenue management and stakeholder engagement. The literature gap is found between association of pricing and other climate policy instrument and the management of the policies by the government in order to achieve low administration cost and optimisation of carbon emission reduction.

Callon, M. (2009). Civilizing markets: Carbon trading between in vitro and in vivo experiments. The problem of global warming is known vastly and one of the solutions to this problem is the formation of carbon market. In the section of *Accounting, Organizations and Society*, the controversy revolving around the manner in which these markets are organised, the tools used to equip them and the role they have to perform. While considering these controversies, the article believes that carbon markets are the ongoing experiment. The stakes involved in the experiment of carbon trading is exceptional and it explores the dynamic of civilized market.

Schaltegger, S., &Csutora, M. (2012).Carbon accounting for sustainability and management. Status quo and challenges. The paper shows carbon accounting as an important issue and also a growing topic in the field of sustainable development. The paper suggests a more approachable measure to prevent the negative impacts of climate change due to green house gas emission and also different effects of climate change. There are four types of carbon accounts that are evolving- scientific, economic, political and corporate. All these accounts are somehow related but are not interlinked. The corporate level of accounting carbon has two different approaches to manage the carbon- sustainability and un-sustainability improvement of carbon accounts. The two approaches have a significant role in all the functions of the corporate whether it is production or marketing. The benefits of carbon management is to that it helps in organization

decision making, improve energy organization and also helps to enhance efficiency and innovation of the product. Gibassier, D., &Schaltegger, S. (2015). Carbon management accounting and reporting in practice: a case study on converging emergent approaches. The carbon accounting for the internal issues of the company is yet to be diagnosed, the focus is only limited to the reporting of stakeholder and regulation. The study shows one of the aspect of accounting i.e. carbon accounting that has an environmental capital effects and it shows the convergence between two approaches of carbon management accounting in a company. The qualitative study of this analysis raises the question of an effective system of carbon accounting. Further, the study shows a combined system of carbon management accounting by combining two corporate approaches of carbon management accounting. This will make carbon accounting management efficient in measuring performance and external communication.

Ascui, F. (2014). A review of carbon accounting in the social and environmental accounting literature: what can it contribute to the debate? The paper explains the literature of carbon accounting to equip the social and environmental accounting (SEA). The generalization of SEA project is being investigated by the literature gap of the study. The literature of SEA on carbon accounting is huge, varied and evolving. There is a mix of critical, philosophical or normative discussions about carbon accounting, and empirical studies of carbon accounting, with specific clusters of papers in carbon management accounting, carbon financial accounting, carbon disclosure and reporting, and carbon accounting education. The attraction of researchers in SEA project, huge practice and research opportunities, mutual learning and cooperation and focus on new accounting of carbon accounting is liberating.Lodhia, S. K. (2011). Why we need carbon pricing: A social and environmental accounting perspective. The paper connects the carbon pricing through different perspective of social academic and environmental. The paper relates the present pricing developments of carbon with social and environmental accounting literature. The carbon pricing is justified by the research on social and environmental accounting. The social and environmental accounting is related to the pricing of carbon is discussed for the first time in this paper.Wilting, H. C., &Vringer, K. (2009). Carbon and land use accounting from a producer's and a consumer's perspective–an empirical examination covering the world. The policy for producer approach is adopted to reduce environmental pressure from emission and the usage of natural resources. Producer approach means the pressure built within the borders of a company. The study is conducted for 12 regions and uses two approaches incoherent to GHG

emission and land use. A quantitative approach of 87 countries is done for GHG emission. A multi-regional input-output (MRIO) model is used to calculate consumption-related GHG emissions and land use per capita. This analysis is significant for international footprint analysis. The consumer approach of GHG emission and land use per capita is higher than producer approach of a developed country. The scenario is opposite for developing country.

Akbaş, H. E., &Canikli, S. (2019). Determinants of voluntary greenhouse gas emission disclosure. The study is conducted in Turkey, a developing country, to understand the literature of GHG disclosure and the voluntary disclosure by the firms. The financial feature and structure of firm impacts voluntary disclosure decisions and it is a determinant of GHG disclosure in a Turkish firm. To understand the GHG disclosure of a firm, two proxies is used. The first proxy is called sensitiveness tendency and it shows the response of the firm towards Carbon Disclosure Project (CDP) survey. The second proxy is called "transparency tendency" and it represents the disclosure behaviour of firms. The conclusion of the study by regression model on 84 listed companies of turkey states a positive relation of institutional ownership and market value with the sample firms' sensitivity and it shows a negative relation with the board size. Also, the results showsa positive impact of the firm size, profitability and institutional ownership with the transparency of Turkish listed firms.

Firm's Value

Firm value represents company's performance, and the return on equity usually measures it combined with ROI (return on investment), Tobin's Q, return on assets, and EPS (earnings per share). Menezes (2019) examined the association between CSR investment and financial results of the firm's using the data collected from the top 10 CSR spending companies for five years. The results show that ROA and EPS have not significant influenced by CSR spending while on the other hand, net profit shows a significant association. Omnamasivaya and Prasad (2017) evaluated whether the green accounting disclosures affected the finances of the company or not. For this study, the annual reports of NIFTY companies for 2011 to 2015 were analyzed, and the financial performance was assessed using variables such as net profit margin, ROE, EPS, DPS and PER (price-earnings ratio). The study found a negative association between EAD and Net profit margin and dividend payout ratio.

Hart and Ahuja (1996) examined the effect of decreasing emission on financial performance of an entity. The study was performed on the S & P 500 list companies and 127 firms were drawn as a sample to conduct the research. The method used to find the impact of emission on a firm's performance is evaluated by considering three different dependent variables- Return on Sales, Return on Asset, and ROE. The findings of the study show a strong link between carbon emission reduction and a firm's financial performance. Okafor, A, Adeleye, &Adusei, M. (2021) in their research presents substantive evidence about how the costs incurred on socially responsible causes has a favorable impact on the growth of US technology firms considering the long-term. The study uses content analysis and pooled regression models to evaluate the impact of CSR on a firm's financial performance established in the US. The analysis is based on panel data from the 100 companies at the top, listed in the S&P500 technology companies during year 2017 and 2019. The study investigates the relationship between business financial performance and CSR indicators. The major findings show that technology companies that spend more on Corporate Social Responsibility see an increase in their top line and bottom line both.

Research Methodology

A sample of 49 manufacturing companies has been taken from Nifty 100 listed companies, the data was collected for the period of three years from 2019-2021 from Prowess-IQ and the annual report. The criteria for the sample that used are: companies Listed in Nifty, publish the annual report and sustainability report in 2019-2021, and as well as companies that implicitly or explicitly disclose carbon emissions.

Research Variables Volume of Carbon Emission is measured by content analysis to find the amount of volume of carbon emission which was disclosed in Sustainability Reports. This research has adapted the CDP Questionnaires which has 18 items. Disclosure of Carbon Management Practice is measured by scoring, giving maximum score 18 and the minimum score is 0. Each item is worth 1 if the company discloses all of the information in the report so that mean company score is 18. Score on each company then totaled and divided by 18. The Carbon Emission Disclosure checklist, adapted fromChoi et al., 2013. emission disclosure was measured using a dummy variable, where the value of 1 to companies that disclose Carbon Management in the annual report and sustainability report, while a value of 0 is the opposite where the company does not disclose Carbon Management in the annual report and sustainability report

The following hypotheses were framed for this study:

H1: There is significant relationship between carbon management practice disclosureandfirm value

H2: There is significant relationship between carbon emission disclosure and firm value.

H3: There is significant relationship between volume ofcarbon emission and firm value.

Disclosure of Carbon Management Practice and Carbon Emission (Choi et al., 2013)

Tabel 1. Carbon emission disclosure checklist.

GHG Emission	GHG1- The first and foremost disclosure under the Emissions category deals with the direct emissions of Green House Gases in the form of carbondioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs) GHG2- The next disclosure deals with the indirect emissions of Green House Gases which include the gases emitted from functions related to energy like purchased or acquired heating, cooling, electricity, and steam (Existence external verification of quantity of GHG emission- if so by whom and on what basis) GHG3- The third parameter includes the other indirect emissions of Green House Gases as a result of functions not directly under the control of the organization, like its upstream activities GHG5- fourth disclosure under this category encompasses the intensity of emissions of the Green House Gases by the functioning unit, bifurcated into direct emissions, indirect emissions related to energy and other indirect emissions related to its upstream or downstream activities.	
Energy Consumption	EC1- Total energy consumed (total consumption of energy generated in the form of electricity, heating, cooling or steam from either non-renewable resources or renewable resources) EC2- The second disclosure under this standard deals with the energy consumed by the organization outside of it EC3- The third disclosure under energy deals with the energy intensity ratio of the entity EC4- The fourth disclosure under the same category deals with a reduction in energy consumption EC5- The fifth sub-disclosure under energy deals with the reductions in energy consumption for products and services sold during the reporting period	
Biodiversity	The first sub-standard under biodiversity deals with the functional units of an entity near to or within areas granted the protected status or areas which are of very high value in terms of their biodiversity. The firm needs to disclose the type of function it performs in such area, namely, office, manufacturing, or extraction, along with the size of such a functional unit. Second deals with the direct and indirect impacts of such functional units of the entity on the surrounding biodiversity in the form of infrastructure building, pollution, the	

	introduction of pests, changes in the composition of ecosystems to name a few. A specific disclosure needs to be made by the reporting entity whether such alterations are temporary or permanent	
Effluents and Waste	The first sub-standard under the updated standards deals with the quality of water discharged and the destination of such discharge. Next deals with the type of waste discharged, i.e., hazardous or non-hazardous, along with the disposal methods used namely reused, recycled, compost, landfills, and the likes. The related impacts of such spills on the environments need specific disclosures. It deals with transportation of hazardous waste produced by the functioning unit including such waste imported, exported, and treated.	
Carbon Emission Accountability	Indication of which board committee (or other executive body) has overall responsibility for actions related to climate change Second Describe the mechanism by which the board (or other executive body) reviews the company's progress regarding Carbon pollution	
Environmental Compliance	This standard takes into account the non-compliance activities of the reporting entity about its environment. This provides information to the stakeholders regarding the degree of ethical practices adopted by the entity. No such fine imposed on the entity should also be significantly disclosed.	

Results and Analysis

Carbon Emmissionis the independent variable and firms value as the dependent variables.Research variables volume of Carbon Emission, Carbon emission disclosure and disclosure of carbon management practice. Firm's value is measured by net profit margin and return of assets. This research was adapted the CDP Questionnaires which has 18 items. Disclosure of Carbon Management Practice is measured by scoring, by giving maximum score is 18 and the minimum score is 0

The table below shows the relation between independent variables and Net Profit Margin.

Table 1 Model Summary

Model	R Square	Adjusted R Square
1	0.84	0.67

R^2= 0.84 and Adjusted R^2= 0.67, this indicates that there are some variables that are statistically insignificant.

Table 2Anova

Model	F	Sig.
1	2.38	.001a

p value= 0.001<0.05= α (level of significance)

Thus, we fail to accept H0.

Therefore, Atleast one regression coefficient is statistically significant.

Table 3 Coefficient

		B	t	Sig.
1	(Constant)	11.476	4.671	.000
	Carbon Management Practice	.103	4.390	.002
	Carbon Emission Disclosure	3.011	1.650	.000
	Volume of carbon emission	-1.897	-1.010	.318

a. Dependent Variable: Net Profit Margin

p values of the coefficient volume of carbon emission isless than 0.05 and hence we fail to reject the null hypotheses which state that the regression coefficients of these variables are statistically significant.

Therefore, volume of carbon emission is not statistically significant.

The table below shows the relation between independent variables and Return on Asset.

Table 4 Model Summary

Model	R Square	Adjusted R Square
1	0.87	0.72

R^2= 0.87 and Adjusted R^2= 0.72, this indicates that there are some variables that are statistically insignificant.

Table 5 Anova

Model	F	Sig.
1	0.883	.002a

p value= 0.002<0.05= α (level of significance)Thus, we fail to accept H0.

Therefore, Atleast one regression coefficient is statistically significant

Table 6 Coefficient

		B	t	Sig.
1	(Constant)	11.440	4.671	.000
	Carbon Management Practice	2.103	6.390	.001
	Carbon Emission Disclosure	-3.011	-1.650	.002
	Volume of carbon emission	-1.897	-1.010	.318

a. Dependent Variable: Return on Asset

p values of the coefficient volume of carbon emission is more than 0.05 and hence we fail to reject the null hypotheses which state that the regression coefficients of these variables are statistically insignificant.

Therefore, volume of carbon emission is not statistically significant.

Finding and discussion

Hypotheses testing H1 was rejected because of the significance value. p values of the coefficient volume of carbon emission isless than 0.05 and beta value is positive hence we reject the null hypotheses which state that the regression coefficients of these variables are statistically significant.

Hypotheses testing H2 was rejected because of the insignificant value. Hypotheses testing H3 was fail to reject because of the insignificant value, It means that if volume of carbon emission was increasing, it will reduce the firm value. p values of the coefficient volume of carbon emission is less than 0.05 and hence we fail to reject the 2nd and 3rd hypotheses which state that the regression coefficients of these variables are statistically significant. Therefore, volume of carbon emission is not statistically significant.

Managerial Implications

For usinga fresh approach to studying the carbon emission by companies and their impact on firm value can be used for policy making in the manufacturing companies. The decision is that developing countries, which have limited resources, must be encouraged to report and disclose carbon emissions, moving from voluntary reporting to mandatory disclosure by government regulation, not just for high sensitive sector but also for low sensitive industry. Therefore, developing nations with limited resources should adopt a more proactive approach to prevent carbon emissions rather than reduce them.

Limitation and further research directions:

The data was extracted from ProwessIQ, so the limitation of the database would inherently be the limitations of the study. As we extracted some data from annual reports of sample firms, we could not afford to take a significant sample and proceeded with a small sample size which might

have some limitations in the generalizability of the results. Thus, future studies can consider taking a more significant sample. This study uses certain variables regarding the impact of environmental accounting disclosures on firm value, which can be affected by many variables. Hence, future studies can use other variables. Other financial parameters of a firm's value, such as tobin's Q, return on shareholders, earnings per share and dividend per share, etc., can be used in future research.

Conclusion

The study examined the impact of carbon emission on firm value in the context of selected manufacturing companies. Volume of Carbon emmision has no significant bearing on the value of a firmwhile carbon management practice has significant impact on firm value and its an individual hypotheses only carbon management practice disclosure have relationship with firm performance. As the regulatory environment becomes more strict, firms, particularly those in developing countries need to take a more proactive strategy to prevent carbon pollution with their limited resources. The carbon market is a better option for developing country to reduce the emission of greenhouse gases by transferring its funds or technology. The sustainability and annual reports of specific companies are used to calculate the carbon disclosure score. A checklist is created to assess the depth and breadth of the information on carbon emissions.

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