

CLIMATE CHANGE AND CARBON CREDIT ACCOUNTING: AWARENESS AMONG ACADEMICIANS AND PROFESSIONALS

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ABSTRACT

The Kyoto Protocol was signed in 1997 by 192 countries as the international community wanted to make drastic changes in the way the environment is treated by decreasing the level of emissions. Under the Kyoto Protocol, various market-based mechanisms were developed for the reduction of greenhouse gas. This reduction in greenhouse emission is measured and carbon credits are allotted for the same in the ratio of 1 carbon credit certificate for reduction of 1 ton of carbon. Such carbon credits can be sold in the international markets to those emitters who are not able to fulfill their commitments. Thus the Kyoto Protocol has established a flexible broad-based international mechanism that provides a valuable starting point for shaping efficient climate policies in the world. It has created an entirely new product which can be traded on the exchange. When the carbon credits are earned and sold in the market the concerned companies' have to show them in their financial statements. Thus trained financial professionals are required who have adequate knowledge about the method of carbon credit accounting and the way in which it has to be disclosed in the financial statements. This study is an attempt to understand the level of awareness among the academicians and professionals about climate change and carbon credit accounting.

KEYWORDS: *Carbon Credits, Certified Emission Reductions, Clean Development Mechanism, Greenhouse Gas, Kyoto Protocol, and Carbon Credit Accounting*

INTRODUCTION

The concept of Carbon Credits was first introduced in the Kyoto Protocol in December 1997. The Kyoto Protocol (KP) is an agreement between 192 countries, which limits the amount of Green House Gases (GHGs) emissions by developed countries. The protocol agreed to the maximum amount of GHGs that each participating developed countries can emit and this amount was known as 'caps' or 'quotas'. These countries in turn, set quotas on the emissions of industries and other local organizations within the country. These are recorded and managed through national 'registries' which are in turn validated and monitored by the United Nations Framework for Climate Change Convention (UNFCCC). Each organization has an allowance of credits where each credit equals to 1 ton of carbon dioxide or equivalent gas that can be emitted. If the organizations and the country exceed their emission beyond their limit, they will have to buy carbon credits from the international financial market as a cost for polluting the air. These 'carbon credits' are actually like a share certificate which is provided by UNFCCC and matches to 1 ton of carbon dioxide or equivalent.

These certificates can be traded in the market and are bought by polluters who have not been able to limit the pollution in their country to the level that they have agreed to.

The KP provides three market-based mechanisms for generating carbon credits and using them for meeting their target emission reductions. The first option is Joint Implementation (JI) where a developed country with relatively high costs of domestic greenhouse reduction would set up a project in another developed country that has a relatively low cost and earn Emission Reduction Units (ERU) which is required to meet their emission reduction targets. The second project-based mechanism is the Clean Development Mechanism (CDM), where a developed country can 'sponsor' a greenhouse gas reduction project in a developing country. On the one side, the developing country which is the host country for the project would receive the capital investment, clean technology, and the developed country will get a share of the carbon credits generated known as the Certified Emission Reductions (CERs). The third option is the International Emissions (IE) trading which gives countries that have excess units to spare an opportunity to sell them to those countries whose emissions have exceeded their allowable limits.

STATEMENT OF THE PROBLEM

India is a signatory to the UNFCCC and ratified the protocol in August 2002. India has played a significant role in supporting the Kyoto Protocol by participating in the CDM project mechanisms. Around 2938 projects were implemented in India by November 2015 which amounts to an investment of INR 1.6 trillion and has generated over 170 million Certified Emission Reductions (CERs) that can be sold in the international market and earn profits. With this, India is the second largest investor behind China and ahead of Brazil, Mexico, and South Korea in implementing such projects. The commoditization of carbon has created a need for proper recording of the process of the generation of carbon credits the expenses related to such projects. This has created a situation where trained financial professionals are required who have adequate knowledge about the methods of carbon credit accounting and its disclosure. Academicians play a major role in increasing awareness about climate change and the methods of carbon credit accounting among finance students. Hence it is imperative that the academicians and professionals keep themselves updated about the changes in the environment, the steps taken to mitigate climate change and also the various business opportunities created in the process.

REVIEW OF LITERATURE

Patnaik, B.C.M. et. al. (2016) in their article studied the importance of Carbon Credit Accounting and did a survey among the finance students and professionals of Odisha in the emerging field of carbon credit accounting. They concluded that the awareness level was very low among even the educated masses and suggested that more of social media should be used to make people aware of credits for reducing carbon emission. Kamath, Manoj. S & Manasvi M in their paper titled "An Evaluation of the perceptions in Carbon Accounting and Reporting in India" (2015), analyses whether the practicing accountants and educators are aware of Carbon Accounting and the key dynamics involved in reporting the same. The article reveals that very few corporations are voluntarily accounting and disclosing carbon emission and divergent practices are followed by them. There is very little awareness among the accountants and educators due to non-availability of proper guidance. Dhingra, Neha & Dhingra, Manish (2010), in their paper "Carbon Credits: Level of awareness in Indian SMEs" has surveyed the level of awareness regarding carbon credits in Indian SMEs located in UPSIDC, Parsekhera, and Bareilly. A sample of 8 industries was selected and it was found that most of the industrialists were aware of the carbon emissions and they are actively involved in reducing their

carbon emissions. Mostly companies are engaged in planting trees, water harvesting, etc. to maintain the ecosystem.

The above review of the literature reveals that no study has been carried out focusing on the awareness of the academicians and professionals in Kerala and hence an effort is made to fill the gap.

SIGNIFICANCE OF THE STUDY

There are some articles which have assessed the awareness of finance students, professionals, educators, Indian SMEs about the carbon emissions, accounting, and its disclosure in Odisha, UP, and other states of India. This study makes an attempt at understanding the awareness level among the academicians and professionals in the most literate state of India, i.e. Kerala on the subject of climate change and carbon credit accounting.

SCOPE OF THE STUDY

This study is an attempt to understand the general awareness about climate change and carbon credit accounting methods among the academicians and professionals of Kerala. The variables taken to assess the general awareness about climate change were- awareness about climate change, the effects of carbon emission on the environment, the adoption of the environmental treaty of The United Nations Environment for Climate Change, the formation of the National Clean Development Authority in India for helping the implementation of CDM projects and the term carbon credit. The awareness on Carbon Credit Accounting was analyzed using the variables like-awareness on:- how carbon credits are earned, the compliance requirements for earning carbon credits, methods of carbon credit accounting, clean development mechanism to reduce emissions, issuing authority for CERs, the importance of carbon credits for profitability and brand value.

The sample is taken from the academicians working in government-aided colleges and professionals like chartered accountants and cost accountants of all age groups ranging from below 30 to above 51.

OBJECTIVES OF THE ARTICLE

The objectives of the study are:

- To understand the general awareness about the climate change and related issues among the academicians and professionals in Kerala.
- To know the level of understanding about Carbon Credit Accounting among the academicians and professionals in Kerala.

HYPOTHESES

- **H₀:** There is no significant difference between the academicians and professionals based on occupation about the general awareness of climate change.
- **H₀:** There is no significant difference between the academicians and professionals based on gender about the general awareness of climate change.
- **H₀:** There is no significant difference between the academicians and professionals based on age about the general awareness of climate change.

- **Ho:** There is no significant difference between the academicians and professionals based on occupation about the awareness of Carbon Credit Accounting.
- **Ho:** There is no significant difference between the academicians and professionals based on their gender about the awareness of Carbon Credit Accounting.
- **Ho:** There is no significant difference between academicians and professionals based on their age groups about the awareness of Carbon Credit Accounting.

RESEARCH METHODOLOGY

The empirical study was preceded by the literature review of carbon credit related issues and their awareness in journals, magazines, websites, newspapers etc. Following the literature survey, it is clear that there is a gap with regard to the awareness on climate change and carbon credit accounting in Kerala. Hence a study was undertaken using a structured questionnaire for conducting a survey in Kerala. A sample of 90 Academicians and Professionals were taken on the basis of convenience sampling.

The questionnaire was divided into three parts, the first part of the questionnaire measures the demographic features like gender, age, occupation while in the second and third parts, the general awareness among the respondents about the climate change and awareness about Carbon Credit generation and its Accounting related issues were analyzed. For finding out the awareness, 5 points Likert Scale was administered.

The significant difference between the awareness of Academicians and Professionals on the basis of occupation, gender and age were tested. The researchers checked the reliability of the scale and the instrument used for data collection by working out Cronbach alpha which is a ratio very much similar to correlation coefficient, whose value should be more than 0.7 to judge a scale or questionnaire to be most reliable.

Reliability Statistics

Table 1

Cronbach's Alpha	No. of Items
.853	11

Source: Primary Data

The Cronbach's Alpha of the questionnaire used for the study workouts to 0.853 indicating the scale and questionnaire are reliable and are implementable.

Percentage analysis, Mean, Independent t-Test and One way ANOVA was used for the analysis. A mean of 3 and above is considered a good indicator of awareness of the said the variable.

Sources of Data

The secondary sources for the article were Journals, Websites, Magazines and newspapers, libraries. The Primary data was collected using a structured questionnaire administered to the respondents. The nature of questions was open-ended, close-ended, multiple choice and dichotomous questions.

ANALYSIS OF THE RESULTS

Demographic Profile

The respondents belonged to different age groups and are Academicians who are commerce and management studies faculties in government and aided colleges and professionals like chartered accountants, cost accountants, residing in Kerala.

Demographic Profile of Respondents

Table 2

Gender	Total	%	Occupation	
			Academicians	Professionals
MALE	50	55.55	28	22
FEMALE	40	44.44	24	16
TOTAL	90	100	52	38
%			57.77	42.22

Source: Primary Data

Out of the total 90 respondents, 50 (55.55%) were male and 40 (44.44%) were female and 57.77 % are academicians and 42.22 % are professionals.

General Awareness about Climate Change

The general perception is that there is a general awareness about climate change among the people of Kerala especially among the educated classes like the academicians and professionals. The first part of the article analyses the general awareness about climate change, the effect of carbon emission, knowledge of United Nations Framework Convention on Climate Change, National Clean Development Authority, and Carbon Credits.

Ho: There is no significant difference between the academicians and professionals based on occupation about the general awareness of climate change.

Table 3: General Awareness about Climate Change on the basis of Occupation

Variables	Occupation	Mean	T- Test		Remarks
			T	Sig.	
Climate change	Academicians	3.90	1.846	0.069	Not significant
	Professionals	3.47			
Effects of Carbon emission	Academicians	3.67	0.993	0.324	Not significant
	Professionals	3.47			
UNFCCC	Academicians	3.08	0.749	0.456	Not significant
	Professionals	2.79			
NCDMA	Academicians	2.44	-0.696	0.488	Not significant
	Professionals	2.66			
Carbon Credit	Academicians	2.77	0.870	0.387	Not significant
	Professionals	2.53			

Source: Primary Data

The values are not significant on a 5% level of significance and hence it can be concluded that there is no significant difference among the academicians and professionals on the general awareness level about climate change and related issues. The mean values indicate that the academicians and professionals are aware of climate change and effects of carbon emission. But the academicians are more aware of UNFCCC. For other variables like awareness about

NCDMA, Carbon Credit, the mean for both academicians and professionals are less than 3 hence they are less aware.

Ho: There is no significant difference between the academicians and professionals based on gender about the general awareness of climate change.

Table 4: General Awareness about Climate Change on the Basis of Gender

Variable	Gender	Mean	t- Test		Remarks
			T	Sig.	
Climate change	Male	3.80	0.754	0.453	Not significant
	Female	3.63			
Effects of Carbon emission	Male	3.58	-0.075	0.940	Not significant
	Female	3.60			
UNFCCC	Male	3.02	0.502	0.617	Not significant
	Female	2.88			
NCDMA	Male	2.62	0.633	0.528	Not significant
	Female	2.43			
Carbon Credit	Male	2.70	0.269	0.788	Not significant
	Female	2.63			

Source: Primary Data

From the above analysis, it has been found that the *p values* are not significant at 5% level of significance. There is no significant difference between the academicians and professionals on the basis of gender about general awareness of climate change. The means show that there is greater awareness about climate change, effects of carbon emission, than about NCDMA and carbon credit. The male respondents are more aware of UNFCCC than the females.

Ho: There is no significant difference between the academicians and professionals based on age about the general awareness of climate change.

Table 5: General Awareness about Climate Change on the Basis of Age

Variables	Age	N	Mean	SD	F Value	P Value	Remarks
Climate Change	30 years and below	50	3.58	1.162	0.638	0.593	Not Significant
	31-40 years	31	3.90	1.044			
	41-50 years	7	3.86	0.900			
	51 and above	2	4.00	0.000			
Effects of carbon emission	30 years and below	50	3.44	1.264	0.645	0.588	Not Significant
	31-40 years	31	3.74	1.237			
	41-50 years	7	4.00	1.000			
	51 and above	2	3.50	2.121			
UNFCCC	30 years and below	50	2.66	1.394	2.334	0.080	Not Significant
	31-40 years	31	3.19	1.327			
	41-50 years	7	3.71	0.756			
	51 and above	2	4.00	0.000			
NCDMA	30 years and below	50	2.40	1.443	0.766	0.516	Not Significant
	31-40 years	31	2.84	1.485			
	41-50 years	7	2.14	1.215			
	51 and above	2	2.50	2.121			
Carbon Credit	30 years and below	50	2.44	1.296	1.201	0.314	Not Significant
	31-40 years	31	2.90	1.350			
	41-50 years	7	3.14	1.069			
	51 and above	2	3.00	1.414			

Source: Primary Data

The analysis in Table 3 shows the awareness about climate change among different age groups and the *p-value* in all the cases is not significant at 5% level of significance. Thus it can be concluded that there is no significant difference between the awareness level among the academicians and professions on the basis of age. From the means of the groups, it can be seen that the awareness is relatively high about climate change and effects of carbon emission irrespective of their ages. But respondents below the age of 30 are not much aware of UNFCCC. The respondents of all age groups are not much aware of NCDMA and respondents below 40 years are less aware of the concept of Carbon Credit.

Awareness about Carbon Credit Accounting

The term Carbon Credit and its accounting is a relatively new term for the general public. But here an attempt is made to gauge the level of awareness among the academicians and professionals about the method of earning carbon credits, the compliance requirements for earning carbon credits, clean development mechanism, carbon credit accounting methods, the authority which issues carbon credit and the value addition to the brand of the product if it is produced using green technology.

Ho: There is no significant difference between the academicians and professionals based on occupation about the awareness of Carbon Credit Accounting.

Table 6: Awareness about Carbon Credit Accounting Based on Occupation

Variable	Occupation	Mean	T- Test		Remarks
			T	Sig.	
Earning Carbon credits	Academicians	2.21	-0.818	0.416	Not significant
	Professionals	2.45			
Compliance requirements	Academicians	2.13	-0.658	0.512	Not significant
	Professionals	2.32			
Clean Development Mechanism	Academicians	2.33	-0.518	0.606	Not significant
	Professionals	2.47			
Carbon Credit Accounting Methods	Academicians	1.81	-2.021	0.047 *	Significant
	Professionals	2.45			
Issuing Authority	Academicians	1.90	-2.116	0.038 *	Significant
	Professionals	2.55			
Brand Value addition	Academicians	2.73	-0.282	0.779	Not significant
	Professionals	2.82			

Source: Primary Data

From the above Table 4, it can be inferred that the value is significant at 5% level of significance in the case of awareness about methods of carbon credit accounting and issuing authority of carbon credits. Hence it can be concluded that there is a significant difference between the means of academicians and professionals with respect to both the variables. But for all other variables, the *p-value* is not significant. It can be concluded that there is no significant difference between the means of academicians and professionals on their awareness about earning carbon credits, compliance requirements, clean development mechanisms, and brand valuation. At the same time, the means of academicians and professionals regarding all the variables for awareness of Carbon Credit Accounting is less than 3, indicating that the awareness is less.

Ho: There is no significant difference between the academicians and professionals based on their gender about the awareness of Carbon Credit Accounting.

Table 7: Awareness about Carbon Credit Accounting Based on Gender

Variable	Gender	Mean	T- Test		Remarks
			T	Sig.	
Earning Carbon credits	Male	2.26	-0.407	0.685	Not significant
	Female	2.38			
Compliance requirements	Male	2.32	0.898	0.327	Not significant
	Female	2.08			
Clean Development Mechanism	Male	2.48	0.729	0.468	Not significant
	Female	2.28			
Carbon Credit Accounting Methods	Male	2.10	0.162	0.872	Not significant
	Female	2.05			
Issuing Authority	Male	2.16	-0.131	0.896	Not significant
	Female	2.20			
Brand Value addition	Male	2.62	-1.148	0.254	Not significant
	Female	2.95			

Source: Primary Data

Table 5 shows that the *p-value* of all the variables associated with awareness about carbon credits accounting between male and female are not significant. Hence there is no significant difference between the means of all the variables associated with awareness about carbon credits accounting among the genders.

Ho: There is no significant difference between academicians and professionals based on their age groups about the awareness of Carbon Credit Accounting.

Table 8: Awareness about Carbon Credit Accounting Based on Age

Variables	Age	N	Mean	SD	F Value	P Value	Remarks
Earning Carbon credits	30 years and below	50	2.32	1.421	0.454	0.715	Not Significant
	31-40 years	31	2.42	1.259			
	41-50 years	7	2.00	0.577			
	51 and above	2	1.50	0.707			
Compliance requirements	30 years and below	50	2.20	1.385	0.503	0.681	Not Significant
	31-40 years	31	2.35	1.279			
	41-50 years	7	1.86	0.378			
	51 and above	2	1.50	0.707			
Carbon Credit Accounting Methods	30 years and below	50	2.26	1.575	0.896	0.447	Not Significant
	31-40 years	31	1.97	1.378			
	41-50 years	7	1.43	0.535			
	51 and above	2	1.50	0.707			
Clean Development Mechanism	30 years and below	50	2.50	1.389	0.792	0.502	Not Significant
	31-40 years	31	2.39	1.308			
	41-50 years	7	1.86	0.900			
	51 and above	2	1.50	0.707			
Issuing Authority	30 years and below	50	2.40	1.485	1.026	0.385	Not Significant
	31-40 years	31	1.97	1.378			
	41-50 years	7	1.71	1.254			
	51 and above	2	1.50	0.707			
Brand Value addition	30 years and below	50	2.82	1.453	0.134	0.939	Not Significant
	31-40 years	31	2.65	1.253			
	41-50 years	7	2.86	1.345			
	51 and above	2	3.00	1.414			

Source: Primary Data

Table 6 shows the awareness about carbon credit accounting among the academicians and professionals based on their age groups and the *p-value* for all the variables is not significant. Thus there is no significant difference on the general awareness about carbon credit accounting among different age groups and they have very less awareness about carbon credit accounting.

FINDINGS

The collected data was analyzed and came out with the following conclusions:-

- It can be understood that the academicians and professionals have the same level of understanding on climate change and related matters. They are more aware of climate change and effect of carbon emission on the environment but relatively less aware of the steps were taken by the world community to counter this climate change.
- On the basis of gender, there is no significant difference in the awareness level of academicians and professionals. But here also though there is awareness about climate change and effects of carbon emission, the awareness about United Nations framework on climate change, national clean development authority, and carbon credit is less.
- On the basis of age, there is no significant difference between the different age groups on climate change and related matters.
- While comparing means, it was found that the overall awareness level of carbon credit accounting was comparatively low when compared to awareness about climate change. The academicians, as well as professionals, had very less awareness about carbon accounting.
- There is no significant difference between the awareness levels of respondents on the basis of gender. Both male and female academicians and professionals were equally poorly informed about the methods of earning carbon credit, compliance requirements for such projects, accounting, issuing authority of carbon credits and its branding value.
- There is no significant difference in the awareness level of carbon credit accounting among different age groups of academicians and professionals.

CONCLUSIONS

The concept of carbon credit and its accounting is relatively new in India. Kerala is a highly literate state, there was an expectation that people of Kerala will be more aware of the techniques of setting up projects reducing greenhouse gases and accounting of carbon credits. But still not much surprises in the results of the study conducted among academicians and professionals in Kerala. The analysis shows that the awareness of climate change is more but they are not much aware of carbon credit accounting. There is not a much significant difference in the awareness level among the academicians and professionals in Kerala.

SUGGESTIONS

- Children from the school level onwards should be made aware of climate change and effects of carbon emissions.
- Awareness programs regarding climate change, the support provided by various agencies for reduction of emissions, steps taken by the government to encourage green technology should be conducted in all schools and colleges.
- There should be compulsory inclusion in the syllabus of various streams in colleges and professional courses the rules and regulations regarding carbon credit accounting and disclosure.
- There should be regular guidance from IASB and ICA about new developments in emission trading accounting.
- The industry should be made aware of how carbon credits can be generated and the opportunities available in the international market for earning profits by selling carbon credits.
- The government should impose strict regulations on companies which hesitate to introduce green technology in their business.
- There should be strict disclosure of measures taken by each and every business firms to reduce their emissions so that the awareness among them and accounting professionals increases.

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