Evaluating the success of green accounting practices in the banking sector of Bangladesh

Serajul Islam[1*]
Md. Shahidul Islam[2]
Md. Rizwan Hassan[3]
A. B. M. Yasir Arafat[4]
Siddique Ahmed[5]
Sayema Hoque[6]
Tania Sultana[7]

[1,3,7]*Department of Business Administration Int'l Islamic University Chittagong, Bangladesh.*
[1]*Email: serajulislamiiuc@gmail.com*
[3]*Email: Hassan.rizwan@gmail.com*
[7]*Email: taniasultanaiiuc@gmail.com*
[2]*Bangladesh Forest Research Institute, Bangladesh.*
[2]*Email: engr.shahidul.isam@gmail.com*
[4,5,6]*Department of Computer Science and Engineering, Int'l Islamic University Chittagong, Bangladesh.*
[4]*Email: abmya89@yahoo.com*
[5]*Email: drsiddiqueahmed@gmail.com*
[6]*Email: sayemaiiuc@yahoo.com*

Abstract

Green accounting has recently become more popular among Bangladeshi banks in order to reduce environmental damage and maintain ecological balance. Therefore, the main objective of this study is to evaluate the success of green accounting adoption by commercial banks in Bangladesh. Data were collected from Bangladeshi banks and subsequently analyzed using the Structure Equation Model (SEM), Spearman rho correlation, one-sample Wilcoxon signed rank test, Mann-Whitney test and Kruskal-Wallis test to examine factors influencing the present green accounting practice and performance of banks. The study results showed that green accounting knowledge and environmental knowledge contribute significantly to the present green accounting practice in Bangladesh. On the other hand, the policy of Bangladesh bank does not contribute significantly to the present green accounting practice. Additionally, the study's findings also showed that Bangladeshi banks' current use of green accounting practices and their financial performance are positively correlated. According to the study's findings, increasing the use of green accounting practices might improve their performance and improve the efficiency of financial transactions in Bangladeshi banks. The study outcomes may be used to popularize green accounting practices among banks to increase their performance and also save the ecosystem.

1. Introduction

Green banking (GB) provides similar importance to economic, social and environmental concerns in contrast to the typical banking practice of primarily concentrating on commercial motivation alone. This study investigates the fundamental idea behind green banking activities by making use of relevant data and information concerning Bangladesh Bank's initiatives, banks' policy formulation and governance, banks' annual budget allocation and utilization for their green finance and climate risk fund, the composition of the

Green Banking Unit (GBU), Green Office Guide, Environmental Risk Rating (EnvRR) and green finance (the amount disbursed for ETP, the amount disbursed for the projects having ETP, bio-gas plant, sludge treatment plant and solar).

The environmental effects of organisations' activities particularly banks are causing concern worldwide including Bangladesh. As a result, the banking sector has widely implemented pro-environmental strategies including environmental accounting as a preventative tool against environmental degradation. Environmental accounting is currently becoming more popular in the banking sector of emerging nations to mitigate environmental problems including the loss of natural resources. In Bangladesh, there are not many green accounting practices because it has not taken steps to implement green indicators such as Gross Domestic Product and Eco-Domestic Product. Hence, the contribution of the green accounting to the economy is overlooked in the country. The public and private sectors must step forward and collaborate to improve the current green accounting practice in Bangladesh considering the global threat posed by climate change. This paper describes green accounting and its practice in the banking sector in Bangladesh as a contribution to achieving this goal.

1.1. Objectives of the Study
1.1.1. Broad/General Objective
The main objective of this study is to evaluate the green accounting practices of commercial banks in Bangladesh.

1.1.2 Specific Objectives
The following specific objectives are also intended in addition to the broad objectives:
a) To determine the contribution of green accounting knowledge to present green accounting practice.
b) To examine the influence of environmental knowledge on the present green accounting practice.
c) To investigate the role of Bangladesh bank policy in the present green accounting practice.
d) To study the effect of demographic variables (gender, education and monthly income) on the present green accounting practice.
e) To identify the significant contribution of present green accounting practices to the green accounting performance of Bangladeshi banks.

2. Hypothesis
Null Hypothesis 1 (H_0): There is no significant contribution of green accounting knowledge to the present green accounting practice in Bangladesh.

Alternative Hypothesis 1 (H_1): There is a significant contribution of green accounting knowledge to the present green accounting practice in Bangladesh.

Null Hypothesis 2 (H_0): There is no significant influence of environmental knowledge on the present green accounting practice in Bangladesh.

Alternative Hypothesis 2 (H_1): There is a significant influence of environmental knowledge on the present green accounting practice in Bangladesh.

Null Hypothesis 3 (H_0): There is no significant effect of Bangladesh bank policy on the present green accounting practice in Bangladesh.

Alternative Hypothesis 3 (H_1): There is a significant effect of Bangladesh bank policy on the green accounting practice in Bangladesh.

Null Hypothesis 4 (H_0): There is no significant effect of demographic variables (gender, education and monthly income) on the present green accounting practice in Bangladesh.

Alternative Hypothesis 4 (H_1): There is a significant effect of demographic variables (gender, education and monthly income) on the present green accounting practice in Bangladesh.

Null Hypothesis 5 (H_0): There is no significant relationship between the present green accounting practice and the green accounting performance of banks in Bangladesh.

Alternative Hypothesis 5 (H_1): There is a significant relationship between the present green accounting practice and the green accounting performance of banks in Bangladesh.

2.1. Review of Related Journals, Books and Articles
Magablih (2017) finds that green accounting plays an important role in reducing the environmental costs incurred by production companies. There was no statistically significant difference between the arithmetic averages of the various measures of "possibility of measuring the environmental cost of disclosure". In addition, the research suggests allocating a portion of the budget for the protection of the environment as well as developing ways of accounting that can supply relevant environmental data for the purpose of making intelligent judgments (Magablih, 2017).

Deb, Saha, and Rahman (2020) investigated that green accounting procedures have on the overall performance of banks using a panel dataset consisting of 30 DSE-listed Bangladeshi banks. This research uses a method called 2SLS (Two-Stage Least Square) which concludes that environmentally responsible investing considerably boosts the profitability of banks (Deb et al., 2020).

Abdel-Rahim and Abdel-Rahim (2010) explore environmental accounting concepts and potential applications of the environmental reporting concept that might be used by governments to hold businesses more accountable for the externalities they produce. In the first section of their essay, they address the significance of environmental accounting as a component of accounting education. They also investigate the regulatory and obligatory status of environmental accounting in the past and present as well as the link between environmental accounting and other professions. The second section presents a proposal for an obligatory environmental filing system and investigates the possible characteristics and advantages of such a system (Abdel-Rahim & Abdel-Rahim, 2010).

Hanifa and Kahar (2015) analyzed data collected from four students using the discourse analysis method and discovered that accounting students recognize the importance of green accounting which has an indirect influence on a company's implementation of the green accounting method. This provides a comprehensive perspective on the influence of the academic background of students on their green accounting implementation.

Astawa, Ardina, Yasa, and Parnata (2018) made an attempt to develop a variety of green accounting models by including additional variables such as aspects of the local culture. There were two stages to the research process. The first stage is to develop the model based on theoretical investigations that examine both the primary and supplementary components of green accounting. In the second phase of the procedure, the model is validated at sixty five-star hotels by means of the collection of data through a questionnaire and the analysis of those data using descriptive statistics.

Almbaidin (2014) used primary data collected through the use of a questionnaire to conduct a study into the effectiveness of Accounting Information Systems (AIS) in Jordanian banks. One of the hypotheses and findings that emerged from the research was that AIS is a useful tool for meeting the demands of planning, observation, and decision-making operations in Jordanian banks. A summary of environmental accounting for sustainable development in Vietnam was presented by Giang, Binh, Thuy, Ha, and Loan (2020). This study investigates the methodology and measurement of sustainable accounting. Additionally, it assesses the impact of several factors on how environmental accounting is applied to the practice of sustainable development. According to the findings of the study, environmental accounting which focuses on the preservation of ecosystems by means of environmental reporting is a relatively new phenomenon that has not yet attained a widespread following in Bangladesh. The practices of environmental accounting are the primary subject of the study which aims to improve environmental quality.

Previous research has investigated the effect of corporate social responsibility (CSR), environmental cost and reporting and corporate governance on the effective administration of natural resources and the environment in various countries (Maria Monica, 2020). This research focuses on enhancing environmentally responsible accounting processes as well as the quality of the environment.

Yeasin (2018) conducted research that investigated the role that corporate social responsibility (CSR), environmental cost and reporting and good corporate governance play in the effective management of natural resources and the environment worldwide. The results of this study which also focuses on improving environmental protection and environmentally conscious corporate practices show that the value of green accounting to the economy is still unclear (Yeasin, 2018).

Abbasi, Khanmohammadi, Moradi, and Mahmoodiyan (2019) investigate "Capacity Building Green Accounting Consequences Based on Explanation of Strategic Management Accounting Techniques by analysing Critical Analysis of Research and Development(CARD) and develop the theory of Rough known as Evolution of Research on Statistical Techniques (ERST) which is another contribution to the field of green accounting. The research makes use of developmental, applied and hybrid methods of research methodology and the research is conducted with two different groups of target population participants (Abbasi et al., 2019).

Green accounting as a concept and its contribution to enhancing the corporate social responsibility (CSR) of businesses are strongly emphasised by Kumari (2019). According to the findings of the study, the primary purpose of green accounting is to assist businesses in better comprehending the significance of environmental goals. The topic of green accounting is still in its beginning stages since the majority of businesses are unconcerned about the effects that their activities have on the environment. The implementation of a green accounting system is crucial for improving business performance. The research conducted by Moorthy and Yacob (2013) sheds light on the difficulties that green accounting poses for businesses in terms of financial reporting and presents an overview of a set of green accounting metrics that are to be handled inside an organization's environmental management accounting system.

Kaium Masud, Mi Bae, and Kim (2017) studied the scope and nature of environmental accounting and reporting across listed banks in Bangladesh in 12 main categories. The annual reports of twenty banks that were traded on the Dhaka Stock Exchange (DSE) during the years 2010 and 2014 were examined to obtain the necessary information. According to the findings, the financial institutions provided a substantial amount of environmental information across all 12 categories. According to the findings of the study, banks published the least amount of environmental information when it came to environmental recognition and waste management categories. On the other hand, banks disclosed information when it came to green banking and renewable energy categories.

According to the findings of research conducted by Belal (2000) who looked at 30 recent annual reports of Bangladeshi corporations and related them to the year 1996, businesses in Bangladesh provided very little environmental disclosure. According to the findings of the survey, 90 % of businesses provided some sort of environmental disclosure; however, this figure plummeted to 20% when disclosures about expenditures on energy consumption were disregarded. The number and quality of environmental disclosures in developing countries such as Bangladesh appear to be inadequate and bad as compared to industrialized nations. One example of such a country is Bangladesh. The study's authors advise conducting further research on the topic.

A theoretical model for comprehensive national accounting was expanded by Huhtala and Samakovlis (2003) to include the welfare consequences of pollution on human capital. The model incorporates a production externality in the form of a flow of air pollutants. These pollutants are responsible for both direct waste and indirect welfare impacts since they have a detrimental impact on the productivity of labor.

The green accounting administration takes into consideration environmental costs and performance information to assist in the decision-making process for businesses. The information that has been gathered pertains to the costs of production, inventory, excess treatment and conservational performance. In other words, green accounting management is a reciprocal strategy that supports the movement of information from financial accounting to cost accounting in order to increase efficiency, lessen environmental dangers and minimize the cost of ecological protection.

Lohmann (2009) emphasises the significance of sustainable accounting. First, it makes environmental disasters more obvious to decision-makers by classifying them as having clear pre-existing correspondences or quantitative linkages with assets and other financial things. This makes it easier for decision-makers to take action to prevent or mitigate environmental disasters. Second, green accounting assists in the transformation of chemicals into marketable 'goods and services' whose value may be 'found' in various marketplaces.

3. Research Method

A survey was administered to green accounting bankers in the port city of Chattogram in order to investigate the impact that environmentally responsible banking procedures have had on the banking industry in Bangladesh. The closed-ended survey questionnaire with a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was built using existing literature and the expertise of writers. The questionnaire was pre-tested with the selected 20 experienced respondents and it was then changed accordingly. A total of 500 bankers who work in green accounting received the completed questionnaire by email, WhatsApp and hand-to-hand using a purposive sampling technique inside a randomized block design. There were a total of 417 questionnaires that were filled out and 400 valid replies were chosen and coded for the final analysis using software from Microsoft Excel 2016, IBM Statistical Package for Social Science Research (SPSS) statistics 26 and International Business Machines Corporation -IBM SPSS Amos 22(Analysis of Mathematical and Operational Structure). These responses covered a confidence level of 95%, a margin of error of 5% and a population percentage of 50% with an infinite population size. There were 272 male respondents (68%) and 128 female respondents (32%) respectively in the pool of valid responses. According to the respondents' levels of education, 138 (34.5%) had bachelor's degrees, 218 (54.5%) possessed master's degrees and 44 (11%) were Ph.D. holders. In terms of the distribution of income, 142 of the respondents earned less than 30,000 btk per month, 104 of the respondents made between 30,000 and 45,000 btk per month, 90 of the respondents earned between 40,000 and 60,000 btk per month and 64 of the respondents earned more than 60,000 btk per month.

Descriptive statistics for each response variable were computed and the Kolmogorov-Smirnov test and the Shapiro Wilk test were carried out to determine whether or not the data from the survey response variables follow a normal distribution. Median values were taken into consideration after the normality test was completed and the results were analyzed in order to test the non-parametric hypothesis. The response variables present factor analysis with Cronbach's alpha values for each factor and Kaiser-Meyer-Olkin measures for sampling adequacy in order to classify the response variables into green accounting knowledge, environmental knowledge, Bangladesh bank policy, current green accounting practice and green accounting performance factors. A t-test with one sample was carried out to assess whether or not there was a significant connection between green accounting knowledge, environmental knowledge, Bangladesh bank policy, existing green accounting practice and green accounting performance characteristics. In addition, the Structure Equation Model (SEM) was established so that influential components could be identified. The convergent validity was tested using the Average Variance Expected (AVE) and the discriminant validity was tested using the Maximum Shared Variance (MSV). The results of these tests may be seen in Tables 2 and 3 respectively. After that, the Spearman rho correlation was computed to determine the degree to which the variables were linked to one another. In addition, the one-sample Wilcoxon signed rank test, the Mann-Whitney test and the Kruskal-Wallis test were carried out to assess whether or not there was a significant association between the current green accounting practice and demographic characteristics.

Items with Cronbach alpha values of 0.65 or above are deemed eligible for the final survey (Henseler, Ringle, & Sinkovics, 2009). The findings of the pilot survey must be subjected to the Cronbach alpha test in order to confirm the reliability of the items that will be used in the research. The questionnaire was then distributed to the respondents following the completion of any necessary modifications.

4. Result and Discussion

4.1. Descriptive Statistics of Respondents

The descriptive statistics (N, min, max, median) and normality tests (Kolmogorov– Smirnov test and Shapiro–Wilk test) of the respondent values for green accounting knowledge, environmental knowledge, Bangladesh bank policy present green accounting practice and green accounting performance are shown in Table 1.

Table 1. Descriptive statistics and normality test results.

Sl. no.	Questionnaire	Variable name	N	Min.	Max.	Kolmogorov–Smirnov test (Sig)	Shapiro–wilk test (Sig)	Median
1.	Green accounting knowledge	Average GAKnldg	400	2.00	5.00	0.108 (0.000)	0.939 (0.000)	3.17
1. (a)	Banking economic activity	GAKnldg1	400	2	5	0.235 (0.000)	0.868 (0.000)	3
1. (b)	Banking business activity	GAKnldg2	400	2	5	0.215 (0.000)	0.876 (0.000)	3
1. (c)	Bank global environmental activity	GAKnldg3	400	2	5	0.197 (0.000)	0.869 (0.000)	3
1. (d)	Environmental effect of green accounting	GAKnldg4	400	2	5	0.213 (0.000)	0.878 (0.000)	3
1. (e)	Effect of environmental change	GAKnldg5	400	2	5	0.211 (0.000)	0.869 (0.000)	3
1. (f)	Present activity on green accounting	GAKnldg6	400	2	5	0.238 (0.000)	0.868 (0.000)	3
2.	Environmental knowledge	Average EnvKnld	400	2.17	4.83	0.100 (0.000)	0.947 (0.000)	3.67
2. (a)	Environmental information	EnvKnld1	400	2	5	0.208 (0.000)	0.864 (0.000)	4
2. (b)	Knowledge of environmental awareness	EnvKnld2	400	2	5	0.226 (0.000)	0.872 (0.000)	4
2. (c)	Knowledge of biodiversity	EnvKnld3	400	2	5	0.274 (0.000)	0.844 (0.000)	4
2. (d)	Sound living planet for the future generation	EnvKnld4	400	2	5	0.249 (0.000)	0.865 (0.000)	4
2. (e)	Environmental risk	EnvKnld5	400	2	5	0.223 (0.000)	0.867 (0.000)	4
2. (f)	Environmental disclosure	EnvKnld6	400	2	5	0.213 (0.000)	0.866 (0.000)	4
3.	Bangladesh bank policy	Average BBPolcy	400	2.20	5.00	0.180 (0.000)	0.848 (0.000)	4.20
3. (a)	Present policy on green accounting	BBPolcy1	400	2	5	0.216 (0.000)	0.846 (0.000)	4
3. (b)	Present initiative on green accounting	BBPolcy2	400	2	5	0.277 (0.000)	0.779 (0.000)	4
3. (c)	Green investment policy	BBPolcy3	400	2	5	0.296 (0.000)	0.763 (0.000)	4
3. (d)	Climate risk fund policy	BBPolcy4	400	2	5	0.277 (0.000)	0.845 (0.000)	4
3. (e)	Influence of green accounting practice	BBPolcy5	400	2	5	0.263 (0.000)	0.833 (0.000)	4
4.	Present green accounting practice	Average PrentGA1	400	2.20	4.80	0.213 (0.000)	0.885 (0.000)	4.00
4. (a)	Bank work on environmental quality	PrentGA1	400	2	5	0.209 (0.000)	0.854 (0.000)	4
4. (b)	Bank spends on environmental protection	PrentGA2	400	2	5	0.223 (0.000)	0.867 (0.000)	4
4. (c)	Environment-friendly accounting practice	PrentGA3	400	2	5	0.218 (0.000)	0.869 (0.000)	4
4. (d)	Green capital budget	PrentGA4	400	2	5	0.263 (0.000)	0.860 (0.000)	4
4. (e)	The practice of green accounting	PrentGA5	400	2	5	0.228 (0.000)	0.871 (0.000)	4

Sl. no.	Questionnaire	Variable name	N	Min.	Max.	Kolmogorov–Smirnov test (Sig)	Shapiro–wilk test (Sig)	Median
5.	Green accounting performance	Average GAPrfrm	400	2.20	4.80	0.213 (0.000)	0.885 (0.000)	3.00
5. (a)	Present practice on green accounting	GAPrfrm1	400	2	5	0.209 (0.000)	0.854 (0.000)	3
5. (b)	Bank environment on green accounting	GAPrfrm2	400	2	5	0.223 (0.000)	0.867 (0.000)	3
5. (c)	Benefitted from green accounting	GAPrfrm3	400	2	5	0.218 (0.000)	0.869 (0.000)	3
5. (d)	Bank performance on green accounting	GAPrfrm4	400	2	5	0.263 (0.000)	0.860 (0.000)	3
5. (e)	Utilization of green banking	GAPrfrm5	400	2	5	0.228 (0.000)	0.871 (0.000)	3

The minimum and maximum values for each response were 2 and 5 based on the above descriptive analysis result. The Kolmogorov-Smirnov test statistic value for green accounting knowledge, environmental knowledge, Bangladesh bank policy present green accounting practice and green accounting performance ranged from 0.197 to 0.238, 0.208 to 0.274, 0.216 to 0.296, 0.209 to 0.263 and 0.209 to 0.263 at the 5% significance level. According to the Kolmogorov-Smirnov test results, Bangladesh bank policy present green accounting practice and green accounting performance had average values of 0.108, 0.100, 0.180, 0.213 and 0.213 which were significant at the level of 5%.

Table 2. Factor analysis, Cronbach's alpha, convergent validity and divergent validity test results.

Factor name	Rotated component matrix[a]						Cronbach's alpha	Convergent	Square
	Variable name	Component					Cronbach's alpha	Validity (AVE)	Root of AVE
		1	2	3	4	5			
Green accounting knowledge	GAKnldg1	0.933					0.950	0.674	0.821
	GAKnldg6	0.915							
	GAKnldg2	0.882							
	GAKnldg3	0.882							
	GAKnldg5	0.869							
	GAKnldg4	0.838							
Environmental knowledge	EnvKnld1		0.950				0.897	0.562	0.750
	Envknld6		0.950						
	EnvKnld5		0.768						
	EnvKnld4		0.762						
	EnvKnld2		0.745						
	EnvKnld3		0.636						
Bangladesh bank policy	BBPolcy3			0.965			0.908	0.523	0.724
	BBPolcy2			0.950					
	BBPolcy5			0.853					
	BBPolcy4			0.775					
	BBPolcy1			0.709					
Green accounting performance	GAPrfrm1				0.928		0.901	0.510	0.713
	GAPrfrm2				0.866				
	GAPrfrm5				0.857				
	GAPrfrm3				0.788				
	GAPrfrm4				0.772				
Present green accounting practice	PrentGA1					0.914	0.901	0.510	0.713
	PrentGA5					0.849			
	PrentGA2					0.845			
	PrentGA3					0.786			
	PrentGA4					0.777			

Note: Extraction method: Principal component analysis.
Rotation method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

For the Shapiro-Wilk test statistic, the value ranged from 0.868 to 0.878, 0.844 to 0.872, 0.763 to 0.846 and 0.854 to 0.871, 0.854 to 0.871 for green accounting knowledge and environmental knowledge. According to the Shapiro-Wilk test results, Bangladesh bank policy present green accounting practice and green accounting performance had average values of 0.939, 0.947, 0.848, 0.885 and 0.885 respectively which were significant at the 5% level. Since the data values of each questionnaire response were not normally distributed, median values were considered to conduct the non-parametric hypothesis testing. The median values of green accounting knowledge, environmental knowledge, Bangladesh bank policy present green accounting practice

and green accounting performance were 3, 4, 4, 4, 3, 3.67, 3.67, 4.20, 4.00 and 3.00, respectively. Subsequently, factor analysis was conducted to test the questionnaire items and classify them into different factors (see Table 2).

4.2. Factor Analysis

Prior to the factor analysis, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was performed to assess the suitability of the data for factor analysis and the KMO value was 0.844 (p-value = 0.000) which exceeds the threshold of 0.80 and endorses the application of factor analysis.

According to the factor analysis table, the survey response values were classified into five-factor variables: green accounting knowledge (factor loading 0.838 to 0.933), environmental knowledge (factor loading 0.636 to 0.950), Bangladesh bank policy (factor loading 0.709 to 0.965), present green accounting practice (factor loading 0.777 to 0.914) and green accounting performance (factor loading 0.772 to 0.928). All the factor loadings were greater than 0.400 which indicates that measurements for each factor have good reliability. The Cronbach's alpha value was 0.950 for green accounting knowledge, 0.897 for environmental knowledge, 0.908 for Bangladesh bank policy, 0.901 for present green accounting practice and 0.901 for green accounting performance. Since all the Cronbach's alpha values were >0.7, the survey response with factors is considered reliable, valid and consistent.

The above factor analysis further showed the definition of each factor variable. To illustrate, (1) green accounting knowledge is identified by (a) banking economic activity (GAKnldg1), (b) banking business activity (GAKnldg2), (c) bank global environmental activity (GAKnldg3), (d) environmental effect of green accounting (GAKnldg4), (e) effect of environmental change (GAKnldg5) and (f) present activity on green accounting (GAKnldg6). (2) Environmental knowledge is identified by (a) environmental information (EnvKnld1), (b) knowledge of environmental awareness (EnvKnld2), (c) knowledge of biodiversity (EnvKnld3), (d) a sound living planet for future generations (EnvKnld4), (e) environmental risk (EnvKnld5) and (f) environmental disclosure (EnvKnld6). (3) Bangladesh bank policy is identified by (a) the present policy on green accounting (BBPolcy1), (b) the present initiative on green accounting (BBPolcy2), (c) the green investment policy (BBPolcy3), (d) the climate risk fund policy (BBPolcy4) and (e) the influence of green accounting practice (BBPolcy5). (4) Present green accounting practice is defined by (a) bank work on environmental quality (PrentGA1), (b) bank expenditure on environmental protection (PrentGA2), (c) environment-friendly accounting practice (PrentGA3), (d) green capital budget (PrentGA4) and (e) practice of green accounting (PrentGA5). (5) Green accounting performance is identified by (a) present practice in green accounting (GAPrfrm1), (b) bank environment in green accounting (GAPrfrm2), (c) benefits from green accounting (GAPrfrm3), (d) bank performance in green accounting (GAPrfrm4) and (e) utilization of green banking (GAPrfrm5). A structural equation model of the relationship between green accounting performance, current green accounting practice, green accounting knowledge, environmental knowledge, and Bangladesh bank policy was developed (see Figure 1) using the findings of factor analysis.
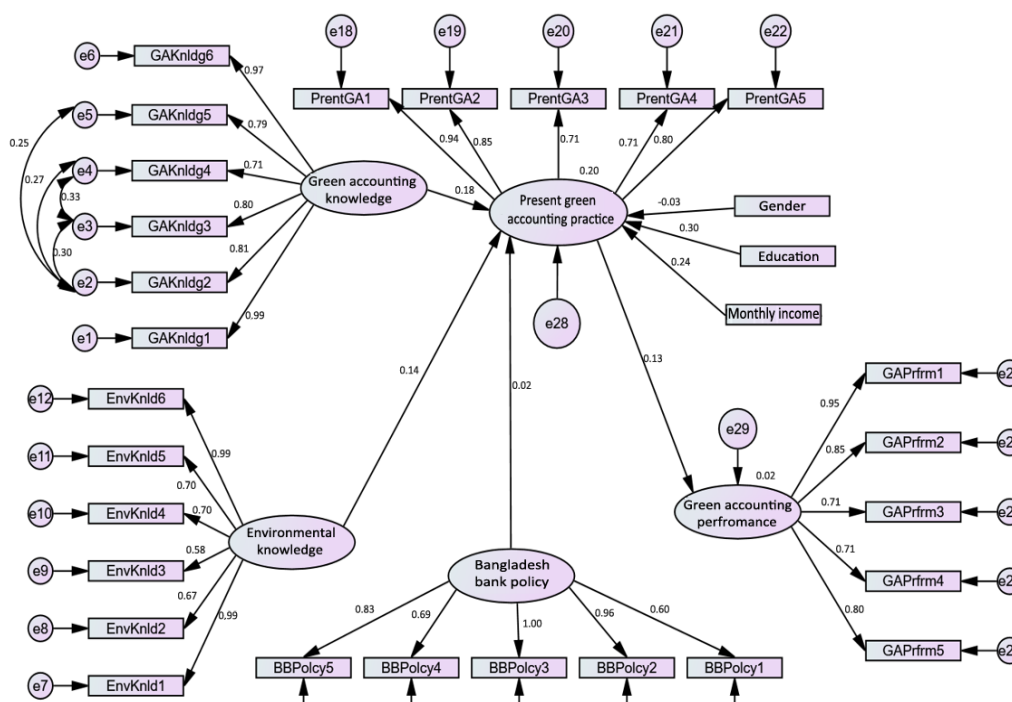

Figure 1. Structure equation model of green accounting.

According to the above structural equation model, the standardized regression weights ranged from 0.71 to 0.99 for green accounting knowledge, 0.58 to 0.99 for environmental knowledge, 0.60 to 1.00 for Bangladesh bank policy, 0.71 to 0.95 for present green accounting practice and 0.71 to 0.95 for green accounting performance. The results indicated that each of the factor loadings was extremely high and statistically significant (p<0.05). The correlation values between errors in the model ranged from 0.25 to 0.33, which was also significant (p< 0.05).

In the selected model, the following model index values were observed: $\chi 2$ /df = 1.893 (which is < 3), comparative fit index (CFI) value = 0.963 (which is > 0.9), incremental fit index (IFI) = 0.964 (which is > 0.9), Tucker Lewis index (TLI) = 0.960 (which is > 0.9), normed fit index (NFI) = 0.926 (which is > 0.9), relative fit index (RFI) = 0.919 (which is > 0.9) and Root Mean Square Error of Approximation = 0.047 (which is < 0.08). Since the model index values fulfill all of the standard requirements of the survey, the selected model is considered well-fitted. Thereafter, AVE and MSV were calculated to test the convergent validity and discriminant validity of the selected model.

Table 3. Model regression weight, Spearman's rho correlation and discriminant validity test results.

Variable name	One-sample Wilcoxon signed rank test (Sig)	Regression weight (Sig) to present green accounting practice	Spearman's rho correlation coefficient (Sig)with present green accounting practice	Discriminant validity square of MSV with present green accounting practice
Green accounting knowledge	6.299 (0.000)	0.174 (0.000)	0.184 (0.000)	0.223
Environmental knowledge	14.847 (0.000)	0.160 (0.003)	0.184 (0.000)	0.163
Bangladesh bank policy	15.594 (0.000)	0.032 (0.689)	− 0.027 (0.588)	0.003
Present green accounting practice	13.783 (0.000)			
Green accounting performance	4.202 (0.000)	0.135 (0.012)	0.085 (0.050)	0.129

Based on the results in Table 2, the AVE values for green accounting knowledge, environmental knowledge, Bangladesh bank policy, present green accounting practice and green accounting performance were 0.674, 0.562, 0.523, 0.501 and 0.610 which were greater than the threshold of 0.5. Therefore, the model has achieved convergent validity. According to Table 3, the MSV values were 0.223 for green accounting knowledge and present green accounting practice which is less than the square root of AVE for green accounting knowledge (0.821) and present green accounting practice (0.713), 0.163 for environmental knowledge and present green accounting practice which is less than the square root of AVE for environmental knowledge (0.750) and present green accounting practice (0.713), 0.003 for Bangladesh bank policy and present green accounting practice which is less than the square root of AVE for Bangladesh bank policy (0.724) and present green accounting practice (0.713), 0.129 for green accounting performance and present green accounting practice which is less than the square root of AVE for green accounting performance (0.713) and present green accounting practice (0.713). Hence, the selected model attained discriminant validity.

The one-sample Wilcoxon signed rank test statistics (median test value 3) for average present green accounting practice was 13.783 (p = 0.000) indicating a significantly present green accounting practice among the respondents. Hypothesis testing was conducted to determine the factors influencing the present green accounting practice in Bangladesh.

4.3. Hypothesis Testing

The one-sample Wilcoxon signed rank test statistics (median test value 3) for average green accounting knowledge was 6.299 (p = 0.000)   suggesting significantly higher green accounting knowledge among the respondents. In the SEM, the regression weight (path coefficient) of green accounting knowledge to present green accounting practice was 0.174 (p = 0.000). This indicates that green accounting knowledge contributes to present green accounting practice in Bangladesh. The Spearman's rho correlation coefficient of green accounting knowledge with present green accounting practice was 0.184 (p = 0.000) denoting the presence of a significant positive correlation between green accounting knowledge and present green accounting practice. Therefore, we reject null hypothesis 1 and conclude that the green accounting knowledge of the respondents contributes significantly to the present green accounting practice in Bangladesh.

The one-sample Wilcoxon signed rank test statistics (median test value 3) for average environmental knowledge was 14.847 (p = 0.000) suggesting that there is significantly higher environmental knowledge among the respondents. Based on the SEM, the regression weight (path coefficient) of green accounting knowledge to present green accounting practice was 0.160 (p = 0.003) indicating the significant contribution of environmental knowledge to present green accounting practice in Bangladesh. The Spearman's rho correlation coefficient of environmental knowledge with present green accounting practice was 0.184 (p = 0.000) which implies that a significant positive correlation exists between environmental knowledge and present green accounting practice. Hence, we reject null hypothesis 2 and conclude that environmental knowledge among the respondents contributes significantly to the present green accounting practice in Bangladesh.

The one-sample Wilcoxon signed rank test statistics (median test value 3) for average Bangladesh bank policy was 15.594 (p = 0.000) indicating a significantly higher Bangladesh bank policy among the respondents. However, in the SEM, the regression weight (path coefficient) of Bangladesh bank policy to present green accounting practice was 0.032 (p = 0.689) suggesting that Bangladesh bank policy does not contribute to the present green accounting practice in Bangladesh. The Spearman's rho correlation coefficient of Bangladesh bank policy with present green accounting practice was -0.027 (p = 0.588) which implies the lack of a significant correlation between Bangladesh bank policy and present green accounting practice. As there is not enough evidence to reject the null hypothesis (3), we conclude that Bangladesh bank policy does not contribute significantly to the present green accounting practice in Bangladesh.

The median values of present green accounting practice among male and female genders were 4.00 and 3.72 respectively and the one-sample Wilcoxon signed rank test statistics (median test value 3) for male and female genders were 11.618 and 7.401 at the significance level of 0.05. This suggests that both males and females have a significantly higher perception of the present green accounting practice. The Mann–Whitney test (z) statistic value for male and female genders was 1.593 (p = 0.111) while in the SEM, the regression weight (path coefficient) of gender to present green accounting practice was -0.056 (p = 0.565). As a result, there is not enough evidence to reject null hypothesis 4 of a lack of significant association between gender and present green accounting practice in Bangladesh.

Table 4. One-sample Wilcoxon signed rank test, Mann–Whitney test and Kruskal-Wallis test results.

Variable name	Measured variable	Number of observations	Median value of present green accounting practice	One-sample Wilcoxon signed rank test (Sig.)	Measured variable comparison test	Test statistic (Sig.)	Regression weight (Sig) to present green accounting practice
Gender	Male	272	4.00	11.618 (0.000)	Mann–Whitney	1.593 (0.111)	-0.056 (0.565)
	Female	128	3.72	7.401 (0.000)			
Education	Graduate	138	3.40	4.526 (0.000)	Kruskal-Wallis	43.380 (0.000)	0.466 (0.000)
	Masters	218	4.40	11.933 (0.000)			
	PhD	44	4.40	5.377 (0.000)			
Monthly income	Below 30000	142	3.60	6.988 (0.000)	Kruskal-Wallis	20.790 (0.000)	0.216 (0.000)
	30000 – 45000	104	3.60	5.860 (0.000)			
	45000 – 60000	90	4.40	7.816 (0.000)			
	Above 60000	64	4.40	6.493 (0.000)			

According to Table 4, respondents with bachelor's, master's, and doctoral degrees reported median values for current green accounting practices of 3.40, 4.40 and 4.40, respectively. The one-sample Wilcoxon signed rank test statistics (median test value 3) of present green accounting practice for respondents with bachelor's, master's and doctor's degrees were 4.526, 11.933 and 5.377 at the significance level of 0.05. This indicates that respondents with a minimum of a bachelor's degree have a significantly higher perception of the present green accounting practice. The Kruskal–Wallis test (chi-Square) statistic value for graduate, master's degree holder and Ph.D. education was 43.380 (p = 0.000) and the regression weight (path coefficient) of education to present green accounting practice in the SEM was 0.466 (p = 0.000) which negates the null hypothesis 4 of a lack of significant association between the demographic variable (education) and the present green accounting practice in Bangladesh. Kruskal–Wallis and one-way analysis of variance tests were further conducted to examine the difference between the contributions of each education level to the present green accounting practice.

Table 5. Pairwise comparisons of present green accounting practice for education.

Dependent variable: Present green accounting practice			
Pairwise comparisons of education		**Test statistic**	**Sig.**
Graduate	Masters	- 6.249	0.000
	PhD	- 4.324	0.000
Masters	PhD	- 0.416	0.677

The test statistic of pairwise comparisons for the perception of present green accounting practice between graduate and master's degrees was -6.249 (p = 0.000) and between graduate and doctorate degrees was -4.324 (p = 0.000).This suggests that graduate and postgraduate (master's and Ph.D.) education have significantly different perspectives on current green accounting practices. As for the perception of present green accounting practice between master's and doctorate degrees, the test statistic value was -0.416 (p = 0.677) which suggests that there is no significant difference in the perception of present green accounting practice between master's degree and Ph.D. holders.

The median values of present green accounting practice among respondents in monthly income categories of $< 30000, 30000-45000, 45000-60000$ and > 60000 were 3.60, 3.60, 4.40 and 4.40 respectively. For the one-sample Wilcoxon signed rank, the test statistics (median test value 3) of present green accounting practice for respondents earning $< 30000, 30000-45000, 45000-60000$ and > 60000 monthly were 6.988, 5.860, 7.816 and 6.493, respectively at the significance level of 0.05. Therefore, respondents from all the monthly income groups have a significantly higher perception of the present green accounting practices. The Kruskal−Wallis test (chi- square) statistic value for all the monthly income groups was 20.790 (p = 0.000). In the structural equation model, the regression weight (path coefficient) of monthly income to the present green accounting practice was 0.216 (p = 0.000) which contradicts null hypothesis 4 of a lack of significant association between monthly income groups and the present green accounting practice. In other words, the demographic variable (monthly income group) has a significant contribution to the present green accounting practice in Bangladesh. For further distinction on the effect of each monthly income group, Kruskal−Wallis and one−way ANOVA tests were conducted.

Table 6. Pairwise comparisons between present green accounting practice and monthly income

Dependent variable: Present green accounting practice			
Pairwise comparisons of income group		**Test statistic**	**Sig.**
Below 30000	$30000 - 45000$	− 0.068	0.946
	$45000 - 60000$	− 3.796	0.000
	Above 60000	− 2.693	0.007
$30000 - 45000$	$45000 - 60000$	− 3.492	0.000
	Above 60000	− 2.497	0.013
$45000 - 60000$	Above 60000	0.648	0.517

Table 6 presents the pairwise comparison of the perceptions of present green accounting practices between respondents earning below 30000 and $30000-45000$ monthly. The test statistic was 0.068 (p = 0.946) indicating the lack of a significant difference in the perception of present green accounting practice between <30000 and $30000-45000$ monthly income groups. For pairwise comparison of the perception of present green accounting practice between< 30000 and $45000-60000$ income groups as well as between < 30000 and > 60000 income groups, the test statistic scores were 3.796 (p = 0.000) and 2.693 (p = 0.007) respectively. For the pairwise comparison of the perception of present green accounting practice between $30000-45000$ and $45000-60000$ income groups as well as between $30000-45000$ and > 60000 income groups, the test statistic values were 3.492 (p = 0.000) and 2.493 (p = 0.007). The results indicate that a significant difference exists in the perception of present green accounting practice between the income groups $< 30000, 30000-45000$, $45000-60000$ and > 60000. Moreover, for the perception of present green accounting practice between respondents earning $45000-60000$ and > 60000 monthly, the test statistic score for pairwise comparison was 0.648 (p = 0.517) which suggests that there is no significant difference in the perception of present green accounting practice between $45000-60000$ and > 60000 monthly income earners. Therefore, it may be concluded that the perception of present green accounting practice is the same between < 30000 and $30000-45000$ as well as between $45000-60000$ and > 60000 income groups but differs between < 30000 (lowest median value - 3.60), $30000-45000, 45000-60000$ and >60000 (highest median value 4.40) monthly income groups.

The one-sample Wilcoxon signed rank test statistics (median test value 3) for average green accounting performance was 4.202 (p = 0.000) indicating a significantly higher average green accounting performance among the respondents. However, the regression weight (path coefficient) of present green accounting practice to green accounting performance was 0.135 (p = 0.012) which suggests that present green accounting practice in Bangladesh contributes significantly to green accounting performance. The Spearman's rho correlation coefficient of present green accounting practice with green accounting performance was 0.135 (p =

0.012) implying that a significant correlation exists between present green accounting practice and green accounting performance. Therefore, we reject null hypothesis 5 and conclude that the present green accounting practice among the respondents contributes significantly to green accounting performance in Bangladesh.

5. Conclusion

The result shows that there is a significantly higher present green accounting practice among the respondents based on their median value (test value 3). This shows that bankers have an extensive understanding of green accounting which influences the current green accounting practice in Bangladesh. On the other hand, the survey result showed that the policy of Bangladesh bank does not contribute significantly to the present green accounting practice in Bangladesh. Male and female customers have no difference in perception regarding green banking practices. All education groups showed a higher perception of present green accounting practices. However, master's and doctor's degree holders had a significantly higher contribution to the present green accounting practice in Bangladesh than bachelor's degree holders. All the monthly income groups have a significantly higher perception of the present green accounting practice. However, respondents earning below 45000 monthly had lower participation in the present green accounting practice than those earning above 45000 monthly. Finally, the study also demonstrates that increasing the present green accounting practice may enhance green accounting performance in Bangladesh and improve transactional efficiency.

6. Recommendations

1. The result showed that the present green accounting practice in Bangladesh is admirable. Therefore, green accounting practices may be encouraged across commercial banks in Bangladesh.
2. The study showed that green accounting knowledge and environmental knowledge contribute significantly to the present green accounting practice. Thus, an awareness program may be developed to increase green accounting knowledge and environmental knowledge which may in turn enhance green accounting practice in Bangladesh.
3. The survey result showed that the policy of Bangladesh bank does not contribute significantly to the present green accounting practice. Therefore, the policy of Bangladesh Bank may be updated with the latest developments in global environmental standards to increase green accounting practice in Bangladesh.
4. Both male and female genders have a significantly higher perception of the present green accounting practice which does not contribute significantly to the present green accounting practice in Bangladesh. Hence, both males and females may be encouraged to participate in the green accounting practice in Bangladesh. 6. As postgraduate (master's and Ph.D.) degree holders were observed to have significantly higher contributions to the present green accounting practice than undergraduate degree holders, a proper motivational program may be developed to promote undergraduate bankers' adoption of green accounting practice in Bangladesh.
5. Bankers earning below 45000 monthly had lower participation in the present green accounting practice than their counterparts earning above 45000. Therefore, bankers earning less than 45000 monthly should be targeted for programs that motivate their participation in the green accounting practice in Bangladesh.
6. Finally, this research finding encourages the adoption of green accounting practices in Bangladeshi commercial banks to enhance their performance as the rise in present green accounting practices in Bangladesh was observed to increase green accounting performance.

References:

Abbasi, B., Khanmohammadi, M., Moradi, Z., & Mahmoodiyan, T. (2019). Capacity building of green accounting consequences based on the explanation of strategic management accounting techniques. *Iranian Journal of Finance, 3*(4), 23-59.

Abdel-Rahim, H. Y., & Abdel-Rahim, Y. M. (2010). Green accounting–a proposition for EA/ER conceptual implementation methodology. *Journal of Sustainability and Green Business, 5*(1), 27-33.

Almbaidin, T. H. (2014). The effectiveness of accounting information system in Jordanian banks: From the management perspective. *International Bulletin of Business Administration, 14*(14), 1451-1243.

Astawa, I. P., Ardina, C., Yasa, I. M. S., & Parnata, I. K. (2018). A new model in achieving green accounting at hotels in Bali. *Journal of Physics: Conference Series, 953*(1), 1-10. https://doi.org/10.1088/1742-6596/953/1/012056

Belal, A. R. (2000). Environmental reporting in developing countries: Empirical evidence from Bangladesh. *Eco-Management and Auditing: The Journal of Corporate Environmental Management, 7*(3), 114-121. https://doi.org/10.1002/1099-0925(200009)7:3%3C114::aid-ema131%3E3.0.co;2-e

Deb, B. C., Saha, S., & Rahman, M. M. (2020). Does green accounting practice affect bank performance? A study on listed banks of Dhaka stock exchange in Bangladesh. *PalArch's Journal of Archaeology of Egypt/Egyptology, 17*(9), 7225-7247. https://doi.org/10.7176/rjfa/11-2-08

Giang, N., Binh, T., Thuy, L., Ha, D., & Loan, C. (2020). Environmental accounting for sustainable development: An empirical study in Vietnam. *Management Science Letters, 10*(7), 1613-1622. https://doi.org/10.5267/j.msl.2019.12.005

Hanifa, S., & Kahar, A. (2015). *Green accounting: Understanding of accounting students*. Paper presented at the First International Conference on Economics and Banking. https://download.atlantis-press.com/article/25373/pdf

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). *The use of partial least squares path modeling in international marketing. In New challenges to international marketing*. Bradford, UK: Emerald Group Publishing Limited.

Huhtala, A., & Samakovlis, E. (2003). Green accounting. *Air Pollution and Health, 82*(2), 1–31.

Kaium Masud, M. A., Mi Bae, S., & Kim, J. D. (2017). Analysis of environmental accounting and reporting practices of listed banking companies in Bangladesh. *Sustainability Switzerland, 9*(10), 1–19. https://doi.org/10.3390/su9101717

Kumari, J. (2019). Green accounting and its importance. *Economics & Computer Science JCECS, 5*(3), 45–48.

Lohmann, L. (2009). Toward a different debate in environmental accounting: The cases of carbon and cost–benefit. *Accounting, Organizations and Society, 34*(3-4), 499-534.

Magablih, A. M. (2017). The impact of green accounting for reducing the environmental cost in production companies. *Journal of Modern Accounting and Auditing, 13*(6), 249-265. https://doi.org/10.17265/1548-6583/2017.06.002

Maria Monica, M. (2020). Concept of green accounting and its practices in India. *International Journal of Accounting and Financial Management Research, 10*(1), 37–44. https://doi.org/10.24247/ijafmrjun20205

Moorthy, K., & Yacob, P. (2013). Green accounting: Cost measures. *Open Journal of Accounting, 2*(1), 4-7. https://doi.org/10.4236/ojacct.2013.21002

Yeasin, H. M. (2018). *Green accounting green accounting september*. London: Routledge.