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Achieving Sustainable Development through Environment Accounting from the Global Perspective: Evidence from Bangladesh

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A B S T R A C T

The study visualizes the link between environment accounting & triple bottom line, quantitative environmental reporting & standard method, voluntary environmental disclosure & legal requirement, size of company & volume of environmental disclosure, material flow analysis & life cycle assessment to achieve sustainable development in Bangladeshi corporation. Therefore, the purpose of the study is to investigate the role of these factors to achieve sustainable development in Bangladeshi corporation. To investigate the role of these factors, ten factors that significantly contribute to achieve sustainable development were determined. A set of closed-minded questionnaire was developed on the basis of these factors to collect the data from employees & employers. Questionnaire was administered by using statistical tools such as matrix, cross tabulation & Paired Samples Tests as a data collection tool and analyses. Research finding shows that sustainability of corporation was associated with the performance of economic, social, and environment. Other factors like quantitative environmental reporting, standard method, voluntary environmental disclosure, legal requirement, size of the company, volume of environmental disclosure, material flow analysis & life cycle assessment were found that they worked as a complement to enhance the performance of economic, social, and environment to achieve sustainable development in Bangladeshi corporation.

1. Introduction

Corporation related to manufacture & distribution of goods & services is important for fulfilling the necessities of society. They have some responsibility to gain an increasing significance for businesses by introducing two parts: environment accounting, and sustainable development. This is also creating a need for Bangladeshi corporation in order to develop environment accounting to be sustainably established.

The recent industrial growth and its adverse-production-effect-on environment have forced Bangladeshi corporation to build up environment accounting. Society is an inseparable part of business where corporation is responsible for establishing well-being of human. For this reason, corporation should be environmentally responsible to reduce negative effects of manufacturing activities. However, the increase of negative impacts on environment can create a jolt to report environment accounting. This jolt also creates an uncertain future for Bangladeshi corporation. In fact, Bangladeshi corporation have encountered some questions regarding sustainable development, such as: what is sustainable development? What is environment accounting? Which factors significantly contribute to meet sustainable development? Therefore, the primary objective of this paper is to find out some factors to answer of these questions by analyzing prior literature work & responder's feedback.

Different scholars have defined sustainable development in different way but most of them agree into one point that sustainable development meets the needs (World Commission on Environment and Development, 1987) without compromising the ability of future generations to meet their own needs. Now the question is what aspect that fulfills sustainable development? It fulfills several conditions such as keeping the overall balance, respecting for the environment, preventing exhaustion of natural resources, reducing production of waste, rationalizing production, energy consumption etc. Whatever sustainable development fulfills is not a big question. The main question is: what has Bangladeshi corporation achieved on sustainable development? To

answer this question, at first we have to define environment accounting since every fulfillment of sustainable development is closely associated with the environment.

Steele and Powell (2002) define environmental accounting as the identification, allocation and analysis of material streams and their related money flows by using accounting systems to give insight in environmental impacts and associated financial effects. Gray, Bebbington and Walter (1993) said that environmental accounting can cover all areas of accounting that may be affected by the response of environmental issues, including new areas of eco-accounting. Shaltegger, Muller and Hindrichsen (1996) give a more specific definition regarding environment accounting stating that it is a sub-area of accounting dealing with activities, methods and systems for recording, analyzing and reporting the financial impacts and ecological impacts of a defined economic system. Thus, they all not only show the relationship between sustainable development and environment accounting but also indicate the significance of standard methods to report more reliable environmental data, and mandatory legal need to show voluntary environmental data, material flow analysis to estimate negative effect of raw materials and life cycle assessment which allocates cost. In this case, corporation should give emphasize to these all factors.

In fact, a lot of research works have done on environment accounting and sustainable development but most of them were in developed country. This study presents the statistical analysis of the contribution of these ten factors to achieve sustainable development, environmental regulatory bodies in Bangladesh, professional body of accounting especially in The Institute of Chartered Accountants of Bangladesh & The Institute of Cost and Management Accountants of Bangladesh, Dhaka Stock Exchange regulatory authorities, Chittagong Stock Exchange regulatory authorities, public limited companies (listed under companies Act XVIII of 1994) in Bangladesh or other developing countries may find the findings of this paper useful.

2. Literature Review

Studies in environment accounting mostly show that environment accounting has a positive relation with the performance of triple bottom line to achieve (Berkel, 2003; Carbon Trust, 2005; Gadenne and Zaman, 2002) sustainable development. They also indicate that if a company discloses anything about environment accounting, this only gives qualitative information (Bala and Yusuf, 2003). Next, we present a brief discussion of relevant earlier research of the very topic.

There are more than 100 definitions of sustainable development. Among those definitions, sustainable development commission perhaps provides the most commonly accepted definition. It defines sustainable development as a development that meets the needs of the present, without compromising the ability of future generations to meet their own needs. It also states that sustainable development promotes the idea in which social, environmental, and economic progresses are all attainable within the limits of our earth's natural resources. Sustainable development approaches everything in the world connected through space, time and quality of life.

Ball (2002) and Milne (1996) refer sustainable development as a three dimensions: economic, social, and environment. Moreover, they show that a company would be sustainable if they sustain triple bottom line (economic, social, and environment). Some scholars argue that companies need to give more accurate cost accounting data on environment and social impacts & should disclose performance of triple bottom line (Berkel, 2003; Carbon Trust, 2005; Gadenne and Zaman, 2002; Hubbard, 2009).

A number of studies (e.g. Lamberton, 2005; Schaltegger and Wagner, 2006; Taplin, Bent and Aeron-Thomas, 2006) have been conducted in the area of sustainability & accounting, but Lange (2003) first demonstrated the relationship between “environment accounting” and “sustainable development”. According to him, environment accounting research purports to find out the indicators of potential pollutant industries, and suggests the best policies on how to regulate these industries. Furthermore, Lange (2003,11) links the discussion on “sustainable development” to inter-generational altruism, and goes after the world commission on environment and development which in turn states that “sustainable development is meeting the needs of the present generation without compromising ability of future generations to meet their own needs.”

In 2005, Rahman and Muttakin surveyed 125 manufacturing companies listed on the Chittagong Stock Exchange (CSE) on May 7, 2005. They analyzed the annual reports of these companies for the year 2003/2004. The researchers found that only 5 companies (4 percent of 125 companies) disclosed environmental information in their annual reports. The information was descriptive in nature; no quantification analyses were made. Shil and Iqbal (2005) surveyed 121 manufacturing companies listed on the Dhaka Stock Exchange (DSE). They reported that only 13 companies (10.74% of 121 companies) disclosed environmental information. Bala and Yusuf (2003) analyzed the annual reports of 249 public limited companies (listed on the Dhaka Stock Exchange) for the year of 2001. They reported that only 26 (10.4 percent of the total) companies disclosed environmental information in the Directors’ Report or in the Chairman’s Statement or elsewhere in their annual reports. The information disclosed was qualitative in nature and those companies did not follow the specific or standard reporting format. Hossain (2002) conducted a survey of annual reports of 150 non-financial companies (listed on the Dhaka Stock Exchange) for the year of 1998-99. The study reveals that only 5 percent of the companies under study disclosed the environmental information in the Directors’ Report or in the Chairman’s Report of their annual reports and none of the companies disseminated any quantitative information about the environmental items. Imam (2000) analyzed annual reports of 34 companies listed with the stock

exchanges of Bangladesh for the year of 1996-97 and found that only 22.5 percent of the sample companies provided environmental information in their annual reports. Belal (1999) surveyed the annual reports of 30 companies of Bangladesh which 28 of them were listed and two were unlisted. He found that 90 percent of the companies made some environmental disclosure. A study conducted for examining environmental reporting status on Petrobangla companies showed that the nature of information was qualitative and did not take any attempt for quantification (Bose, 2006). In addition, companies provided only positive information and ignored negative information. Bose (2006) analyzed 5 years' annual reports of 11 Petrobangla companies for examining their environmental reporting status. He found that in 1998-1999 and 1999-2000, only 45.45% and in 2000- 01, 63.63% and in 2001-02 and 2002-03, only 81.81% of Petrobangla companies disclosed environmental information in their annual reports. This study also shows that most of the Petrobangla companies provided information only on protection of the environment, pollution control, planting of trees and other matters. They did not provide any information about waste generation, conservation of energy, water wastage, recycling of waste and noise nuisance.

Deegan and Gordon (1996) examined the environmental disclosure practices in Australian companies which revealed low voluntary environmental disclosure in Australia. Cunningham and Gadenne (2003) investigated whether an enhancement in environmental regulations acted as a momentum for changes in annual report disclosure behavior and concluded that environmental regulation could work as an impetus for companies to include information on certain environmental issues in the annual report.

Gray et al. (1993) list the following reasons for the absence or inadequate corporate environmental disclosure: absence of any demand for information; absence of a legal requirement; the problem that the cost would outweigh the benefits; and the possibility that the companies had never considered. The World Industry Council for the Environment (WICE, 1994; cited in Solomon and Lewis, 2002) explains that competitors may be a good reason for companies to exclude certain information. Belal and Cooper (2007) carried out a study on the lack of environmental disclosure using in-depth semi-structured interviews in 23 companies across ten industrial sectors in Bangladesh. They conclude that the main reasons for non-disclosure include: lack of legal requirements; lack of knowledge/awareness; poor performance and fear of bad publicity; and lack of resources of small companies.

A number of studies (Cooke, 1991; Ahmed and Nichollas, 1994) have been conducted to find out the relationship between firm size and extent of voluntary environmental disclosure. The findings suggest that there is a significant relationship between firm size and extent of voluntary disclosure. Numerous researchers (e.g. Ullah, 2013; Hossain, 2010; Silva and Christensen, 2004; Spiegel and Yamori, 2004; Ismail, 2002; and Hossain et al., 1995) found a positive relationship between size and the level of information disclosed, while McNally et al. (1982) concluded that size is a dominant corporate characteristic in establishing the leaders' voluntary disclosure practice. Lynn (1992) reported that there was no relationship between company size and the level of corporate environmental disclosure. Versus Abdur Rouf (2011) reported that the extent of corporate environmental disclosure was negatively associated with size of firm.

The International Federation of Accountants (IFAC, 2005) observe that environmental pressure is forcing many organizations to look for new, creative and cost-efficient ways to manage and minimize environmental impacts. Organizations have come to recognize the potential monetary rewards of improved environmental performance. They have discovered that actions for enhancing efficiency in the use of energy, water and other raw materials can bring not only environmental improvements but also significant monetary savings as the costs of materials purchase and waste treatment decrease.

Bala and Yusuf (2003) posited that such current practices demonstrated that no track for environmental costs which were available as it randomly changed. Therefore, there is a need for proper charging and allocation. Distinguishing environmental costs and other costs will lead to a proper cost allocation of these costs and thus can bring a more precise cost and will help to develop sustainability indicators.

3. Research Method

3.1. Data Collection

The study has adopted Bangladeshi corporation with full-time employees exceeding 250, and annual sales turnover of exceeding $35 million which extend into 3 divisional cities namely Dhaka, Chittagong, and Sylhet. The research population of the study comprised all listed manufacturing companies on the Dhaka Stock Exchange, Chittagong Stock Exchange, and public limited companies (listed under companies Act XVIII of 1994) of Bangladesh. The sample size was made up of 439 employees, and employer of these corporations. The total numbers include: 95 employees & 49 employers from listed manufacturing companies on the Dhaka Stock Exchange, 65 employees & 67 employers from Chittagong Stock Exchange & 89 employees & 54 employers from public limited companies.

3.2. Data Analysis

Different statistical models such as correlation matrix, KMO and Bartlett's Test, Total Variance Explained, Communalities, Component Matrix, Rotated Component Matrix were used to analyze the data. For hypothesis testing, this study used Paired Samples Tests to develop null hypothesis & alternative hypothesis.

3.3. Questionnaire Design

The questionnaires were composed of two parts: demographic profile, and factors that significantly contribute to achieve sustainable development. Demographic profile was used to obtain information about respondent's background, gender, age, race, educational level and occupation. A set of closed-minded questionnaire was developed on the basis of environment accounting related all information to focus sustainable development of Bangladeshi corporation to collect responder's feedback. Questionnaire used 5 point summated scaling that starts 1 meaning strongly agree to 5 strongly disagree point scale according to responders' feedback.

4. Data Analysis

The below top half of correlation matrix table contains Pearson correlation coefficient between all pairs of variables, whereas the bottom half contains one-tailed significance of these coefficients (See table 2). The correlation coefficient between a variable and itself is always 1; here the principal diagonal of the correlation matrix contains 1s. The correlation matrix can be used to check the pattern of relationships.

For this reason, the study have to consider the significance values and look for any variable for which the majority of values are greater than 0.05. The determinant value (lies on the bottom) for the correlation matrix is 2.085E-008(0.0002085) which is greater than the necessary value of 0.00001 (below the table value). The correlation matrix table also provides correlation coefficients and p-values for each pair of variables included in the analysis. Close inspections of these correlations can often give insights into the variable structure. The below correlation matrix is for the variables included. Therefore, multicollinearity is not a problem for these variables, and the below correlation matrix provides a reliable variable analysis

Table 1. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.900
Bartlett's Test of Sphericity	Approx. Chi-Square	7666.907
	Df	55
	Sig.	.000

Table 1 indicates that KMO and Bartlett's Test provides some reliable output for Kaiser-Meyer-Olkin to measure sampling adequacy, and Bartlett's test of sphericity to check the adequacy of correlation matrix. For the KMO statistic, Kaiser (1974) recommends a bare minimum of .5. If the values are between .5 and .7 meaning mediocre; between .7 and .8 are good; between .8 and .9 are great; above .9 are superb (Hutcheson and Sofroniou, 1999). Here the KMO value is 0.900, which falls into the range of being great. It means the variable analysis is appropriate for this study.

On the other hand, Bartlett's Test of Sphericity measures the null hypothesis indicating that the original correlation matrix is an identity matrix. As mentioned earlier, the study has to find out some relationships between variables, if the R-matrix were an identity matrix all correlation coefficients would be zero. Here, Bartlett's Test of Sphericity is significant since the significance value < 0.05. A significant test suggests that the R-matrix is not an identity matrix, therefore there are some effective relationships between the variables. For these data, Bartlett's test is highly significant ($p < 0.001$) that is variable analysis is appropriate. Thus, Bartlett's test of spericity is significant, and yielded a value of 7666.907. An association level of significance is smaller than 0.01, thus the hypothesis stating that the inter correlation matrix involving these variables is an identity matrix which is rejected. This means the correlation matrix has significant correlations among at least some of the variables.

Table 2. Correlation Matrix

		Material flow analysis	Quantitative environmental reporting	Triple bottom line	Standard methods	Size of the company	Volume of environmental disclosure	Voluntary environmental disclosure	Legal requirement	Life cycle assessment	Environment accounting	Sex
Corre-lation	Material flow analysis	1.000	.864	.810	.874	.875	.809	.860	.806	.631	.731	-.005
	Quantitative environmental reporting	.864	1.000	.822	.916	.882	.822	.907	.871	.693	.775	-.003
	Triple bottom line	.810	.822	1.000	.887	.768	.716	.779	.742	.549	.649	.017
	Standard methods	.874	.916	.887	1.000	.874	.795	.868	.836	.634	.728	.003
	Size of the company	.875	.882	.768	.874	1.000	.925	.875	.848	.710	.796	.000
	Volume of environmental disclosure	.809	.822	.716	.795	.925	1.000	.821	.869	.787	.867	.007
	Voluntary environmental disclosure	.860	.907	.779	.868	.875	.821	1.000	.935	.771	.896	-.005
	Legal requirement	.806	.871	.742	.836	.848	.869	.935	1.000	.867	.940	-.007
	Life cycle assessment	.631	.693	.549	.634	.710	.787	.771	.867	1.000	.859	-.007
	Environment accounting	.731	.775	.649	.728	.796	.867	.896	.940	.859	1.000	-.008
	Sex	-.005	-.003	.017	.003	.000	.007	-.005	-.007	-.007	-.008	1.000
Sig. (1 – tailed)	Material flow analysis		.000	.000	.000	.000	.000	.000	.000	.000	.000	.458
	Quantitative environmental reporting	.000		.000	.000	.000	.000	.000	.000	.000	.000	.478
	Triple bottom line	.000	.000		.000	.000	.000	.000	.000	.000	.000	.362
	Standard methods	.000	.000	.000		.000	.000	.000	.000	.000	.000	.475
	Size of the company	.000	.000	.000	.000		.000	.000	.000	.000	.000	.498
	Volume of environmental disclosure	.000	.000	.000	.000	.000		.000	.000	.000	.000	.442
	Voluntary environmental disclosure	.000	.000	.000	.000	.000	.000		.000	.000	.000	.458
	Legal requirement	.000	.000	.000	.000	.000	.000	.000		.000	.000	.446
	Life cycle assessment	.000	.000	.000	.000	.000	.000	.000	.000		.000	.443
	Environment accounting	.000	.000	.000	.000	.000	.000	.000	.000	.000		.433
	Sex	.458	.478	.362	.475	.498	.442	.458	.446	.443	.433	

a. Determinant = 2.085E-008

Table 3. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Material flow analysis	8.326	75.693	75.693	8.326	75.693	75.693	8.326	75.693	75.693
Quantitative environmental reporting	1.001	9.102	84.795	1.001	9.102	84.795	1.001	9.102	84.795
Triple bottom line	.735	6.680	91.475						
Standard methods	.271	2.463	93.938						
Size of the company	.194	1.766	95.704						
Volume of environmental disclosure	.145	1.318	97.022						
Voluntary environmental disclosure	.138	1.253	98.275						
Legal requirement	.070	.637	98.913						
Life cycle assessment	.064	.582	99.495						
Environment accounting	.035	.318	99.813						
Sex	.021	.187	100.000						

Extraction Method: Principal Component Analysis

Table 3 presents the number of common variables extracted, the eigenvalues associated with these variables, the percentage of total variance accounted for by each variable, and the cumulative percentage of total variance accounted by the variables. On the basis of Varimax Rotation with Kaiser Normalization, two factors have been extracted in the initial solution. Each factor constituted of all those variables has a factor loading greater than 1. Only two factors in the initial solution have eigenvalues greater than 1. The first factor has an eigenvalue = 8.326. Since the value is greater than 1.0, it explains more variance than a single variable in fact as much as 8.326 times. The second factor has an eigenvalue = 1.001. It is also greater than 1.0, therefore it explains more variance than a single variable. On the contrary, the rest of other factors have eigenvalues less than 1, and it therefore explains less variance than a single variable. The sum of the eigenvalues associated with each factor (component) is (8.326+ 1.001+ .735+ .271+ … + .021) = 11. The cumulative percentage of variance explained by the first two factors is 84.795%. In other words, 84.795% of the common variance shared by the 11 variables is justified by the two factors. The second section of Table 3 shows the variance explained by the extracted factors before rotation. The cumulative variability explained by these two factors in the extracted solution is about 84.795%, and there is no difference from the initial solution. The rightmost section of this table shows the variance explained by the extracted factors after rotation. Noticing that initial solution, unrotated and rotated factor have the same cumulative value.

Table 4. Communalities

	Initial	Extraction
Material flow analysis	1.000	.823
Quantitative environmental reporting	1.000	.882
Triple bottom line	1.000	.717
Standard methods	1.000	.853
Size of the company	1.000	.882
Volume of environmental disclosure	1.000	.852
Voluntary environmental disclosure	1.000	.915
Legal requirement	1.000	.914
Life cycle assessment	1.000	.673
Environment accounting	1.000	.817
Sex	1.000	.998

Extraction Method: Principal Component Analysis.

The Principal Component communalities (Extraction, the initial is always 1.00) range from .673 to .998, thus most of the variance of these variables was justified by this two dimensional variables solution. We can see that 99.8% of the variance associated with variable sex is common, or shared variance. 91.5% of the variance associated with voluntary environmental disclosure, and 91.4% of the variance associated with legal requirement are common, or shared variance. So, these three variables can be referred as the highest associated variables. Next, size of the company and quantitative environmental reporting explained 88.2% variance, standard methods explained 85.3%, volume of environmental disclosure explained 85.2%, material flow analysis explained 82.3%, and environment accounting explained 81.7% of the total variance. Overall, these six variables can be defined as the second highest associated variables.

Likewise, triple bottom line shared 71.7%, and life cycle assessment shared 67.3% variance of the total. This can be referred as explained variables to the total variables analysis. We can see that the corresponding extraction communalities for the common variable analysis were a bit smaller but still show the majority of the

variance of all variables represented in the two variable solutions. Moreover, this table shows how much variance of the variables that has been accounted for by the extracted variables.

Table 5. Component Matrix[a]

	Component	
	1	2
Material flow analysis	.907	
Quantitative environmental reporting	.939	
Triple bottom line	.846	
Standard methods	.923	
Size of the company	.939	
Volume of environmental disclosure	.923	
Voluntary environmental disclosure	.957	
Legal requirement	.956	
Life cycle assessment	.820	
Environment accounting	.904	
Sex		.999

Extraction Method: Principal Component Analysis
a. Two components extracted

Table 6. Rotated Component Matrix[a]

	Component	
	1	2
Material flow analysis	.907	
Quantitative environmental reporting	.939	
Triple bottom line	.846	
Standard methods	.923	
Size of the company	.939	
Volume of environmental disclosure	.923	
Voluntary environmental disclosure	.957	
Legal requirement	.956	
Life cycle assessment	.820	
Environment accounting	.904	
Sex		.999

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
a. Rotation converged in two iterations

The rotated component matrix presents two variables after rotation. To identify what these variables represent, it would be necessary to consider what items loaded on each of the two variables. Ten items are loaded on variable 1. Inspection of these items clearly shows that majority of these items reflect a sustainable development motive. Variable 2 contains sex variable that clearly reflects that 99.9% male and female respondants equally contribute. Variable 1 dictates that every item (loaded items on variable 1) significantly contribute to achieve a sustainable development in Bangladeshi corporation through environment accounting. It is notable that voluntary environmental disclosure (.957) and legal requirement (.956) have the highest rotated value & sequentially contribute size of the company (=.939), quantitative environmental reporting (.939), standard methods (.923), volume of environmental disclosure (.923), material flow analysis (.907), and environment accounting (.904).

Hence, it reveals that all the variables are strongly associated with Bangladeshi corporation to achieve a sustainable development through environment accounting where voluntary environmental disclosure and legal requirement work as a principle variable. So, voluntary environmental disclosure and legal requirement significantly contribute to both Rotated Component Matrix and Communalities. These two components suggest highly significant common variables. Triple bottom line (.846) and life cycle assessment (.820) are defined as the least Rotated variables according to its rotated value. The effectiveness of the least rotated variables depends on the highest rotated variables on both rotated component matrix and communality. So, we can classify the above variables into three categories: (a) perfectly explained variables, (b) high positive variables, and (c) multiple variables

Perfectly explained variables

$$Communality = \frac{\text{Voluntary environmental disclosure+Legal requirement}}{2} = \frac{(.915+.914)}{2} = \frac{1.829}{2} = .9145 \text{ (Average value)}$$

$$Rotated\ component\ matrix = \frac{\text{Voluntary environmental disclosure+Legal requirement}}{2} = \frac{(.957+.956)}{2} = \frac{1.913}{2} = .9565 \text{ (Average value)}$$

The above average value (.9145 & .9565) indicate that both communality and rotated components' matrix have above 91% high degree positive relation between dependent variables and independent variables (perfectly explained variables) or we can say that 91.45% relation of dependent variables (communality) is described by perfectly explained variables and rest of 8.55% relationship is assumed on the basis of probable relation.

Likewise, 95.65% relation of dependent variables is described by perfectly explained variables (independent variables) under rotated components' matrix, the rest of 4.35% relationship cannot be determined or assumed on the basis of probable relation.Thus, it can be inferred (by analyzing voluntary environmental disclosure and legal requirement) that most of the Bangladeshi corporations have disclosed thier environmental reporting. However, they merely disclose qualitative environmental reporting and ignore quantitative information due to legal enforcement.

High positive variables

$$Communality = \frac{\text{quantitative environmental reporting +size of the company +Standard methods +volume of environmental disclosure+Material flow analysis +Environment acc}}{6}$$

$$\frac{(.882+.882+.853+.852+.823+.817)}{6} = \frac{5.109}{6} = .8515$$

(Average value)

$$Rotated\ component\ matrix\ = \frac{\text{quantitative environmental reporting +size of the company+standard methods +volume of environmental disclosure+material flow analysis +environment acc}}{6}$$

$$\frac{(.939+.939+.923+.923+.907+.904)}{6} = \frac{5.535}{6} = .9225$$

(Average value)

The communality and rotated component matrix analysis reveals that all the high positive variables have high degree positive relation among quantitative environmental reporting, size of the company, standard methods, volume of environmental disclosure, material flow analysis & environment accounting (all variables are positively related as a complement). High positive variables under communality explained 85.15% & 92.25% under rotated component matrix that is dependent variables explained by independent variables 85.15% under communality & 92.25% under rotated component matrix.

Here notable that high positive variables explained more (communality=.8515 & rotated component matrix=.9225) in rotated component matrix than communality (has more rotated average value). Therefore, high positive variables significantly relate with Bangladeshi corporation to achieve sustainable development through environment accounting.

Multiple variables

$$Communality = \frac{\text{triple bottom line +Life cycle assessment}}{2} = \frac{(.717+.673)}{2} = \frac{1.39}{2} = .695$$ (Average value)

$$Rotated\ component\ matrix\ = \frac{\text{triple bottom line +Life cycle assessment}}{2} = \frac{(.846+.820)}{2} = \frac{1.666}{2} = .8333$$ (Average value)

The above multiple variable analyses suggest that triple bottom line and life cycle assessment are interrelated with perfectly explained variables and a high positive variable that is effectiveness of multiple variables depend on perfectly explained variables and high positive variables. Life cycle assessment is used to evaluate negative impact of used raw materials (raw materials used in manufacturing process) on environment and to find out strength of relation among variables to achieve sustainable development in Bangladeshi corporation through environment accounting. Every variable significantly contributes to the triple bottom line. Consequently, sustainable development of Bangladeshi corporation through environment accounting is strongly associated with the performance of triple bottom line and it depends on perfectly explained variables and high positive variables.

5. Results and Discussion

Table 7. Environment accounting (v10) * Triple bottom line (v3) cross tabulation

			Triple bottom line					Total
			Strongly agree	Agree	Undecided	Disagree	Strongly disagree	
Environment accounting	Strongly agree	Count	219	0	1	0	0	220
		% within v10	99.5%	0.0%	0.5%	0.0%	0.0%	100.0%
		% within v3	58.9%	0.0%	5.6%	0.0%	0.0%	50.1%
	Agree	Count	80	0	7	3	0	90
		% within v10	88.9%	0.0%	7.8%	3.3%	0.0%	100.0%
		% within v3	21.5%	0.0%	38.9%	17.6%	0.0%	20.5%
	Undecided	Count	67	14	9	0	0	90
		% within v10	74.4%	15.6%	10.0%	0.0%	0.0%	100.0%
		% within v3	18.0%	87.5%	50.0%	0.0%	0.0%	20.5%
	Disagree	Count	0	0	1	14	0	15
		% within v10	0.0%	0.0%	6.7%	93.3%	0.0%	100.0%
		% within v3	0.0%	0.0%	5.6%	82.4%	0.0%	3.4%
	Strongly disagree	Count	6	2	0	0	16	24
		% within v10	25.0%	8.3%	0.0%	0.0%	66.7%	100.0%
		% within v3	1.6%	12.5%	0.0%	0.0%	100.0%	5.5%
Total		Count	372	16	18	17	16	439
		% within v10	84.7%	3.6%	4.1%	3.9%	3.6%	100.0%
		% within v3	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The study corroborates the findings of previous research work (e.g. Lange, 2003; Ball, 2002; Milne, 1996) which suggest that environment accounting and triple bottom line have a positive relation to achieve sustainable development. Most of the respondents emphasize on triple bottom line on a three dimension that is economic, social, and environment. Corporation needs to record accurate cost or manufacturing accounting data on environment and social impacts by indicating the performance (Berkel, 2003; Carbon Trust, 2005; Gadenne and Zaman, 2002; Hubbard, 2009) of triple bottom line. Regarding environment accounting, the findings of the study are consistent with the finding of prior research work (e.g. Lamberton, 2005; Schaltegger and Wagner, 2006; Taplin, Bent, and Aeron-Thomas, 2006) which imply that environment accounting has a positive relation with sustainable development where triple bottom line works as a measurement tools of sustainable development. Accordingly, these two variables are not independent and they significantly contribute to achieve sustainable development. Therefore, we can develop the following hypothesis based on these research findings:

H_0 -: There is no association between environment accounting and the performance of triple bottom line to achieve sustainable development

H_1 -: There is association between environment accounting and the performance of triple bottom line to achieve sustainable development

Table 8. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Environment accounting	1.94	439	1.155	.055
	Triple bottom line	1.38	439	.995	.047

The table above gives descriptive statistics for each of the two variables that are defined by the pair of variables. There are 439 respondents who realized the significance of environment accounting for Bangladeshi corporation, and they have average value of 1.94 for environment accounting with a standard deviation of 1.155. These people also responded for triple bottom line and they have the average value of 1.38 with a standard deviation of .995. The last column gives the standard error of the mean for each of the two variables (triple bottom line =.047 & environment accounting =.055).

Table 9. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Environment accounting & triple bottom line	439	.649	.000

According to Cohen's (1988) conventions, effect size of correlation coefficient .10 represents a weak or small association; a correlation coefficient of .30 is considered a moderate correlation; a correlation coefficient of .50 or larger is regarded to represent a strong or large correlation, and a correlation coefficient of .70 or larger is believed to represent a very large correlation (Cohen, 1988, 79-80). The third column of the table indicates the correlation between the two variables (triple bottom line and environment accounting). The table also shows

that there are 439 people involved in observations (N). Correlation (r) =.649 which belongs to strong correlation that is triple bottom line and environment accounting is strongly & positively correlated to influence alternative hypothesis. The table dictate p value=.000 (significance value). Accordingly, we can compare p value with α level (0.05) to accept or reject alternative hypothesis. Since, p< α, we can reject the null hypothesis that the population of correlation coefficient (ρ) is equal to 0. This means that there is sufficient evidence to conclude that the population correlation (ρ) is different from 0.

Table 10. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Environment accounting - Triple bottom line	.556	.912	.044	.470	.641	12.768	438	.000

From the table, we can see that t value is 12.768 with 438 degrees of freedom, mean value=.556, STD deviation=.912 and p - value = .000 (2-tailed significance value). Here, effect size $(d) = mean/Std.deviation = .556/.912$=.60. According to Cohen convention, an effect size as "small, d ≥ .20", "medium, d≥ .50," "large, d ≥.80" and "very large, d ≥1.30"(Cohen, 1988; p. 40). The estimation of Cohen's d= .60 which belongs to a medium effect which suggests that means are likely different. Since we have paired data and we do not know the population variance of the differences, we can consider α = 0.05 to (Significance Level) accept or reject null hypothesis on the following condition: If p < α – we reject the null hypothesis of no difference. If p > α – we will accept null hypothesis of no difference. Here, p < α (.042<0.05), that is, we have enough evidence to reject null hypothesis. Therefore, we can accept alternative hypothesis that there is association between environment accounting & performance of triple bottom line to achieve sustainable development by rejecting null hypothesis.

Table 11. Quantitative environmental reporting (v2) * Standard method (v4) cross tabulation

			Standard method					Total
			Strongly agree	Agree	Undecided	Disagree	Strongly disagree	
Quantitative environmental reporting	Strongly agree	Count	336	0	7	0	0	343
		% within v2	98.0%	0.0%	2.0%	0.0%	0.0%	100.0%
		% within v4	97.7%	0.0%	41.2%	0.0%	0.0%	78.1%
	Agree	Count	0	9	0	0	0	9
		% within v2	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
		% within v4	0.0%	28.1%	0.0%	0.0%	0.0%	2.1%
	Undecided	Count	8	21	10	1	0	40
		% within v2	20.0%	52.5%	25.0%	2.5%	0.0%	100.0%
		% within v4	2.3%	65.6%	58.8%	7.7%	0.0%	9.1%
	Disagree	Count	0	0	0	12	7	19
		% within v2	0.0%	0.0%	0.0%	63.2%	36.8%	100.0%
		% within v4	0.0%	0.0%	0.0%	92.3%	21.2%	4.3%
	Strongly disagree	Count	0	2	0	0	26	28
		% within v2	0.0%	7.1%	0.0%	0.0%	92.9%	100.0%
		% within v4	0.0%	6.2%	0.0%	0.0%	78.8%	6.4%
Total		Count	344	32	17	13	33	439
		% within v2	78.4%	7.3%	3.9%	3.0%	7.5%	100.0%
		% within v4	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The findings of this empirical study are consistent with the findings of some previous studies (e.g. Rahman and Muttakin, 2005; Shil and Iqbal, 2005; Hossain, 2002; Imam, 2000) which point out that very few companies disclosed environmental information in their annual reports. The information disclosed was qualitative in nature that is how to protect environment, control pollution, planting of trees and other relevant matters. However, the findings of this empirical study are not consistent with the findings of some research work (Belal, 1999; Bose, 2006) which imply that most of the company disclosed qualitative environmental reporting. However, both findings suggest that company only provide qualitative information and ignored quantitative information that is about waste generation, conservation of energy, water wastage, recycling of waste and noise nuisance. Regarding standard method, most of the respondents' (strongly agree=344 and strongly disagree=33) feedback are consistent with the findings of prior studies (Bala and Yusuf , 2003) which suggest that most of the company did not follow standard reporting methods to disclosed environmental information. They point out that adaptation of standard methods can increase more reliability of environmental reporting. So, these two variables are not independent and significantly contribute to achieve sustainable development. Therefore, based on these research findings; we can develop following hypothesis:

H_0 : There is no association between standard method and quantitative environmental reporting to increase reliable environmental information

H_A : There is association between standard method and quantitative environmental reporting to increase reliable environmental information

Table 12. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	quantitative environmental reporting	1.59	439	1.205	.058
	standard method	1.54	439	1.187	.057

Table 12 reports descriptive statistics for each of the two variables defined as the pair of variables. There are 439 people who participated in the quantitative environmental reporting for Bangladeshi corporation, and they have average value 1.59 for quantitative environmental reporting with a standard deviation of 1.205. These similar 439 people also responded for standard method and they have average value 1.54 with a standard deviation of 1.187. The last column gives the standard error of the mean for each of the two variables (quantitative environmental reporting =.058 & standard methods =.057).

Table 13. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	quantitative environmental reporting and standard method	439	.916	.000

The third column of Table 13 indicates the correlation between the two variables (v2 & v4). The table also shows that there are 439 people involved in the observations (N). The correlation (r) =.916 which belongs to very large correlation following Cohen's convention (1988) that is quantitative environmental reporting and standard methods are largely and positively correlated to influence alternative hypothesis. The table informs us that p value=.000 (significance value). Since, p< α, so we can reject the null hypothesis that the population correlation coefficient (ρ) is equal to 0. That is, there is sufficient evidence to conclude that the population correlation (ρ) is different from 0.

Table 14: Paired Samples Test

		Paired Differences					t	df	Sig. (2tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	quantitative environmental reporting - standard method	.048	.492	.023	.002	.094	2.037	438	.042

From the table, we can see that t value is 2.037 with 438 degrees of freedom, p - value = .042 (2-tailed significance value), Mean=.048 & STD=.492. Here, p < α (.042<0.05), that is, paired samples t test failed to reveal a statistically reliable difference between the mean of quantitative environmental reporting (Mean = 1.57, s = 1.26) and standard method (M = 1.13, STD = 1.205) that the variables have, t (438) = 2.037, p = .042, α = .05. So, we can accept an alternative hypothesis that there is an association between standard method and quantitative environmental reporting to increase reliable environmental information by rejecting null hypothesis.

Table 15. Voluntary environmental disclosure (v7) * Legal requirement (v8)cross tabulation

			Legal requirement					Total
			Strongly agree	Agree	Undecided	Disagree	Strongly disagree	
voluntary environmental disclosure	Strongly agree	Count	238	61	0	0	0	299
		% within v7	79.6%	20.4%	0.0%	0.0%	0.0%	100.0%
		% within v8	100.0%	56.5%	0.0%	0.0%	0.0%	68.1%
	Agree	Count	0	47	22	0	0	69
		% within v7	0.0%	68.1%	31.9%	0.0%	0.0%	100.0%
		% within v8	0.0%	43.5%	40.7%	0.0%	0.0%	15.7%
	Undecided	Count	0	0	32	2	0	34
		% within v7	0.0%	0.0%	94.1%	5.9%	0.0%	100.0%
		% within v8	0.0%	0.0%	59.3%	12.5%	0.0%	7.7%
	Disagree	Count	0	0	0	14	2	16
		% within v7	0.0%	0.0%	0.0%	87.5%	12.5%	100.0%
		% within v8	0.0%	0.0%	0.0%	87.5%	8.7%	3.6%

Table 15. *(Continued)*

			Legal requirement					Total
			Strongly agree	Agree	Undecided	Disagree	Strongly disagree	
	Strongly disagree	Count	0	0	0	0	21	21
		% within v7	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
		% within v8	0.0%	0.0%	0.0%	0.0%	91.3%	4.8%
Total		Count	238	108	54	16	23	439
		% within v7	54.2%	24.6%	12.3%	3.6%	5.2%	100.0%
		% within v8	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The findings of this study are consistent with the previous works (e.g. Deegan and Gordon, 1996) which suggest that very few companies disclosed voluntary environmental information in their annual reports. Most Bangladeshi corporations have focused on public welfare to minimize a negative effect of manufacturing activities on environment. However, the study reported that most of the respondents (strongly agree = 238 & strongly disagree = 32) emphasized on legal requirement (Cunningham and Gadenne, 2003). There were some reasons why Bangladeshi corporation could not decide where to focus and where should not, such as lack of knowledge, poor performance and bad publicity on environment accounting which often broke down legality. The result of this study is also consistent with the findings of Belal and Cooper (2007) reporting some reasons for low voluntary environmental disclosure i.e. lack of legal requirements, lack of knowledge/awareness, poor performance and fear of bad publicity, and lack of resources of small companies. Therefore, based on these research findings we can develop following hypothesis:

H4: There is no association between voluntary environmental disclosure and legal requirement to achieve sustainable development

H4: There is association between voluntary environmental disclosure and legal requirement to achieve sustainable development

Table 16. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Legal requirement	1.81	439	1.118	.053
	Voluntary environmental disclosure	1.61	439	1.090	.052

The table above informs us that 439 respondents have average value of 1.61 for voluntary environmental disclosure with a standard deviation of 1.090. These people also responded for legal requirement and they have average value 1.81 with a standard deviation of 1.118. The last column gives the standard error of the mean for each of the two variables (voluntary environmental disclosure=.052 & legal requirement =.053).

Table 17. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Legal requirement & Voluntary environmental disclosure	439	.935	.000

The third column of Table 17 indicates the correlation between the two variables (voluntary environmental disclosure and legal requirement). The correlation (r) =.935 can be categorized as a very large correlation based on Cohen's convention (1988). It means that voluntary environmental disclosure and legal requirement are largely and positively correlated to influence the alternative hypothesis. The table dictates p value=.000 (significance value). Since, p< α, we can reject the null hypothesis that the population correlation coefficient (ρ) is equal to 0. That is, there is sufficient evidence to conclude that the population correlation (ρ) is different from 0.

Table 18. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair1	Legal requirement - Voluntary Environmental disclosure	.198	.399	.019	.161	.236	10.405	438	.000

The table indicates that t value is 10.405 with 438 degrees of freedom, mean value=.198, STD deviation=.399 & p - value = .000 (2-tailed significance value). In this case, effect size $(d) = mean/Std.deviation$=.198/.399=.49 which belongs to a small effect size i.e. means are likely different (Cohen, 1988, 40). We found that p < α (.042<0.05), this means that we have enough evidence to reject null hypothesis. In short, there is no association between voluntary environmental disclosure and legal requirement to achieve sustainable development.

Table 19. Size of the company (v5) *Volume of environmental disclosure (v6) cross tabulation

			Volume of environmental disclosure					Total
			Strongly agree	Agree	Undecided	Disagree	Strongly disagree	
Size of the company	Strongly agree	Count	215	84	0	0	0	299
		% within v5	71.9%	28.1%	0.0%	0.0%	0.0%	100.0%
		% within v6	99.5%	89.4%	0.0%	0.0%	0.0%	68.1%
	Agree	Count	0	10	22	0	0	32
		% within v5	0.0%	31.2%	68.8%	0.0%	0.0%	100.0%
		% within v6	0.0%	10.6%	47.8%	0.0%	0.0%	7.3%
	Undecided	Count	0	0	24	9	0	33
		% within v5	0.0%	0.0%	72.7%	27.3%	0.0%	100.0%
		% within v6	0.0%	0.0%	52.2%	19.1%	0.0%	7.5%
	Disagree	Count	0	0	0	19	0	19
		% within v5	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
		% within v6	0.0%	0.0%	0.0%	40.4%	0.0%	4.3%
	Strongly disagree	Count	1	0	0	19	36	56
		% within v5	1.8%	0.0%	0.0%	33.9%	64.3%	100.0%
		% within v6	0.5%	0.0%	0.0%	40.4%	100.0%	12.8%
Total		Count	216	94	46	47	36	439
		% within v5	49.2%	21.4%	10.5%	10.7%	8.2%	100.0%
		% within v6	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

This study reported that most of the respondents' feedback is consistent with the findings of prior research work (e.g. Cooke, 1991; Ahmed and Nichollas, 1994; Ullah, 2013; Hossain, 2010; Silva and Christensen, 2004; Spiegel and Yamori, 2004; Ismail, 2002; and Hossain et al.,1995) which demonstrate that the extent of corporate environmental disclosure is positively correlated to company's size. They point out that volume of environmental disclosure largely depends on the company's total assets, gross revenue, and the number of employees. However, the study does not corroborate the previous research in the way that size is not a dominant factor to determine corporate environmental disclosure (Lynn, 1992; Versus Abdur Rouf, 2011). The findings point out that the extent of corporate environmental disclosure is negatively correlated with size of company. Based on these research findings, we can develop the following hypothesis:
H1: There is no association between size of the company and the volume of environmental disclosure.
H1: There is association between size of the company and the volume of environmental disclosure.

Table 20. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Volume of environmental disclosure	2.07	439	1.327	.063
	Size of the company	1.86	439	1.436	.069

The table above presents the descriptive statistics for each of the two variables that defined by the pair of variables. The respondents reported the significance of the company size, and have average value of 1.86 for size of the company with a standard deviation of 1.86. The same respondents also gave feedback on volume of environmental disclosure with the average of value 2.07, and standard deviation of 1.327. The last column informs us the standard error of the mean for each of the two variables (size of the company =.069 and volume of environmental disclosure =.063).

Table 21. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Volume of environmental disclosure & Size of the company	439	.925	.000

Table 21 presents the correlation between the two variables (size of the company and volume of environmental disclosure). The correlation (r) =.925 belongs to a very large correlation based on Cohen's convention (1988). This result reveals that the company size and volume of environmental disclosure are largely and positively correlated to influence the alternative hypothesis. The table dictates p value=.000 (significance value). Since $p < \alpha$, we can reject the null hypothesis. This means the population correlation coefficient (ρ) is equal to 0. Therefore, there is sufficient evidence to conclude that the population correlation (ρ) is different from 0.

Table 22. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair1	Volume of environmental disclosure - Size of the company	.210	.546	.026	.158	.261	8.038	438	.000

The table informs us that t value is 8.038 with 438 degrees of freedom, mean value=.210, STD deviation=.546 & p - value = .000 (2-tailed significance value). Here, effect size $(d) = mean/Std.\,deviation$=. 210/.546 =.38 which belongs to a small effect size that is means are likely different (Cohen, 1988, 40). Here, p < α (.042<0.05), so we have enough evidence to reject null hypothesis. To sum up, there is an association between size of the company and the volume of environmental disclosure.

Table 23. Material flow analysis (v1) * Life cycle assessment (v9) cross tabulation

			Life cycle assessment					Total
			Strongly agree	Agree	Undecided	Disagree	Strongly disagree	
Material flow analysis	Strongly agree	Count	208	106	21	0	11	346
		% within v1	60.1%	30.6%	6.1%	0.0%	3.2%	100.0%
		% within v9	100.0%	89.8%	25.6%	0.0%	84.6%	78.8%
	Agree	Count	0	0	15	0	0	15
		% within v1	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
		% within v9	0.0%	0.0%	18.3%	0.0%	0.0%	3.4%
Material flow analysis	Undecided	Count	0	12	24	1	0	37
		% within v1	0.0%	32.4%	64.9%	2.7%	0.0%	100.0%
		% within v9	0.0%	10.2%	29.3%	5.6%	0.0%	8.4%
	Disagree	Count	0	0	22	0	0	22
		% within v1	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
		% within v9	0.0%	0.0%	26.8%	0.0%	0.0%	5.0%
	Strongly disagree	Count	0	0	0	17	2	19
		% within v1	0.0%	0.0%	0.0%	89.5%	10.5%	100.0%
		% within v9	0.0%	0.0%	0.0%	94.4%	15.4%	4.3%
Total		Count	208	118	82	18	13	439
		% within v1	47.4%	26.9%	18.7%	4.1%	3.0%	100.0%
		% within v9	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

These findings are consistent with the results of previous research (IFAC, 2005) signaling that enhancing efficiency in energy, water and other raw materials can bring environmental improvements as well as significant monetary savings. This is because we can save the costs of materials purchase and decrease the waste treatment. It is also found out that most of the Bangladeshi corporation does not properly use material flow analysis to compute negative effect of input and outputs on environment. Regarding life cycle assessment, most of the respondents (strongly agree=208 & strongly disagree=13) emphasize on proper manufacturing cost charging and allocation (Bala and Yusuf, 2003). They point out that corporations need to assess the environmental effect and potential impacts associated with manufacturing activities but they often neglect waste generation, conservation of energy, water wastage, recycling of waste etc. which could be associated with manufacturing activities. Based on these research findings, we therefore can develop this following hypothesis:
H4: There is no association between material flow analysis and life cycle assessment to achieve sustainable development
H4: There is association between material flow analysis and life cycle assessment to achieve sustainable development.

Table 24. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Life cycle assessment	1.88	439	1.039	.050
	Material flow analysis	1.53	439	1.114	.053

The table shows that respondents reported the significance of material flow analysis. They gave the average value of 1.53 for material flow analysis with a standard deviation of 1.114. The result of life cycle

assessment indicates the average value of 1.88 with a standard deviation of 1.039. The last column informs us the standard error of the mean for each of the two variables (v1=.053 & v9=.050).

Table 25. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Life cycle assessment & Material flow analysis	439	.631	.000

The table above indicates the correlation between the two variables (v1 & v9). The correlation (r) =.631 indicates that there is a strong correlation based on Cohen's convention (1988). This means that material flow analysis and life cycle assessment are strongly & positively correlated to influence the alternative hypothesis. The table dictates p value=.000 (significance value). Since, p< α, we can reject the null hypothesis stating that the population correlation coefficient (ρ) is equal to 0. Therefore, there is sufficient evidence to conclude that the population correlation (ρ) is different from 0.

Table 26. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair1	Life cycle assessment - Material flow analysis	.358	.928	.044	.271	.445	8.078	438	.000

From the table, we can see that t value is 8.078 with 438 degrees of freedom, mean value=.358, STD deviation=.928 & p - value = .000 (2-tailed significance value). Here, effect size $(d) = mean/Std.\,deviation = .358/.928$ =.38 which belongs to small effect size that is means are likely different (Cohen, 1988; p.40). From the results, we can say that:

a. Life cycle assessment and material flow analysis were strongly and positively correlated (r = 0.631, p < 0.05)
b. There was a significant average difference between v9 and v1 (t_{438} = 8.078, p < 0.05)
c. On average, v9 was .358 higher than v1 (95% CI [.271, .445])

Therefore, we can reject null hypothesis by (p < α) accepting that there is an association between material flow analysis and life cycle assessment to achieve sustainable development.

6. Conclusion

The study claims that sustainable development of Bangladeshi corporation depends on the performance of environment, social and economy in which environment are the first and the most influential factor. Environment accounting has a positive relation with sustainable development. From the viewpoint of society, it is necessary to ensure the further development of economy but we have limited earth's natural resources to reduce the environment pollution and to ensure the environment protection. Sustainable development refers to social, environmental, and economic developments which should consider the nature and human from the viewpoint of optimum development of the whole biosphere. Very few Bangladeshi corporations disclosed environmental information in their annual reports. Most of the Bangladeshi corporation discloses qualitative information. For this reason, we wonder if no corporations use standard methods to quantify environmental disclosure. This means that reliability of the information is questionable. Very few companies disclosed voluntary environmental information in their annual reports. Lack of environmental awareness and knowledge, legal requirements, poor performance and fear of bad publicity in terms of companies and stakeholders are the reason for low voluntary environmental disclosure. Volume of environmental disclosure largely depends on company's total assets, gross revenue, and the number of employees. Effective material flow analysis of energy, water and raw materials decreased the negative effect on environment as well as the significant monetary savings. Corporations need to charge manufacturing cost and allocate them on the basis of manufacturing effect on environment.

Despite the valuable findings derived from this research, there are some limitations. Firstly, the research work extends into 3 divisional cities (Dhaka, Chittagong and Sylhet) with small research populations that limit this study. It may be interesting to consider other divisional cities with larger research population to gain more acceptable research findings. Besides, this study only considers employees & employers which in fact do not disclose all environmental data. It may be useful to collect public opinion of what they are saying about environment accounting, and how Bangladeshi corporation implement environment accounting to be sustain ably developed. In light of these limitations, I strongly recommend the followings:

1. Most of the Bangladeshi corporation provide qualitative information, yet pay no attention to quantitative information about environment accounting. For this reason, the study has identified some factors (lack of proper knowledge, limit resource to implement, bad publicity, lack of legal requirement) for which Bangladeshi corporation only provides qualitative information about environment accounting. These all

identified factors are strongly responsible for poor performance of Bangladeshi corporation. They stand behind to achieve sustainable development through environment accounting because of this poor performance. These all factors have a negative effect on sustainability, therefore future studies need to develop these all factor to achieve sustainable development through environment accounting.

2. Bangladeshi corporation suffers a lot for waste generation, conservation of energy, water wastage, recycling of waste and noise nuisance. Less awareness about these factors liable them to work as the worst polluters. Therefore, it is strongly recommended for Bangladeshi corporation to give a special attention on these factors (waste generation, conservation of energy, water wastage, recycling of waste and noise nuisance) to achieve sustainable development through environment accounting.
3. Bangladeshi corporation should focus on accountability for their actions such as on legal requirement, and mandatory environmental reporting. It is recommended that Bangladeshi corporation be ethically accountable to implement every procedure of environment accounting to achieve sustainable development.

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