



# Environmental Legislation in Egypt & the Demand for Environmental Auditing: Factor Analysis Approach

G. A. Mousa<sup>1,2,\*</sup>

<sup>1</sup>Faculty of Commerce, Benha University, Egypt.

<sup>2</sup>College of Business Administration, University of Bahrain, Kingdom of Bahrain

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**Abstract:** After enacting the environmental law no. 4 of 1994 in Egypt, the Egyptian Environmental Affairs Agency (EEAA) has imposed penalties and big fines on offending companies. The implications of environmental issues on business lead to the emergence of a number of arguments concerning the demand for environmental auditing. The paper investigates environmental issues in 158 of Egyptian companies after more than 10 years from issuing the environmental law no. 4 of 1994. The aim of the study is to determine the impact of Egyptian law no. 4 of 1994 on the demand of environmental auditing. The results of empirical study indicate that environmental issues have a strong impact on business and their importance is increasing in Egypt. A number of companies provided examples of legitimation, such as a written environmental policy statement, environmental management systems and environmental audits carried out to comply with regulations. Environmental awareness within companies in Egypt still needs to be raised. The demand for environmental auditing in Egypt is limited.

**Keywords:** Accounting; auditing, regression analysis.

## 1. Introduction

Awareness of environmental issues has been rising during the last 20 years and pressure groups have been lobbying in most countries for the enacting of environmental regulations to protect the environment. These laws impose sanctions on offending companies, therefore, environmental issues may have a material effect on companies' financial statements either directly or indirectly (Graves et al., 1996; Specht, 1992; Natale and Ford, 1995; Gray et al., 1993; Sternberg, 2000, Mason, et. al, 1995). The last decade has witnessed environmental risks for organizations, such as, fines, penalties, clean up costs, loss of public confidence, loss of market share and an offending company may lose its licence or be shut down ( see for example, Shields and Boer, 1997; Roussey, 1992; Schaltegger et al., 1996; Patten, 1992; McMurray 1992).

Environmental auditing has attracted increasing attention world wide over the past few years as a new tool to be used in verifying compliance, identifying risks and hazards, assessing the effectiveness of environmental management systems, and limiting environmental liabilities (ICC, 1991; Black, 1998; Maltby, 1995; Boland, 1988; ICAEW, 1992, 2000; Roussey, 1992). Boland (1988) addresses the elements of environmental

auditing and describes how an audit should be conducted. The International Chamber of Commerce (ICC) published a paper on "Environmental Auditing" in March 1989 described the basic elements of environmental auditing and served to inform business on how environmental auditing might improve health, safety, and environmental programmes.

Cordiano (1992) discusses the benefits of environmental audits in detecting, and correcting non-compliance, and also appropriate audit staff qualifications, managerial support, program development, legal issues and information protection. Bailey et al., (1992) argue that environmental auditing has emerged as a means of examining the effectiveness of past environmental impact assessments in an attempt to identify ways of improving the utility and efficiency of future assessments.

Reed (1987) discusses the use of environmental auditing by Canadian firms. This study describes the results of a survey of the Canadian industrial sector, including the fact that individual firms use auditing programs to meet diverse objectives, such as verifying compliance, identifying risks and hazards, and limiting liability. Roussey (1992) discusses accounting and



auditing issues including problems of estimating liabilities, proper accounting procedures, disclosure considerations, risk assessment factors, appropriate audit procedures and possible impacts on the audit report. Brimelow and Spencer (1992) presented a critique of the current state of US EPA and its successes and failures. Dansing et al., (1987) examined the evaluation of government and corporate interests in environmental auditing. The authors concluded that audit programs save money for companies in the long-term.

However, an increasingly substantial number of studies (APB, 1995, 1993; APC, 1991; CICA, 1992, 1994, 1997; Collison et al, 1996; Collison and Slomp, 2000; ICAEW, 1992, 2000; FEE, 1993; Collison and Gray, 1997) have argued that environmental issues have a significant impact on the auditing profession and financial auditors should consider these issues when auditing the financial statements of companies. It can be argued that the importance of environmental auditing stems from the material impact of environmental issues on companies' financial statements and on the auditing profession, as well as the increase of environmental regulation in most countries.

Egypt has enacted environmental law no. 4 of 1994 and its executive regulation in 1995. The law gave companies existing at the time of enhancing law three years to adjust their status according to the requirements of law) and it did not force companies to involve in publicly environmental reports. This law requires each company to keep an environmental record of its environmental activities and comply with other requirements (such as, the permissible levels of air pollutants, water,...etc.). EEAA imposed penalties and big fines on offending companies. Further the sustainability of a number of offending companies was threatened. For example, EEAA shut down a number of cement companies in Helwan area, some metals and steel companies, and also some chemical companies (Law no. 1994, (2002)).

This paper argues that the increase of environmental awareness within Egyptian companies after issuing the environmental law no. 4 of 1994 can lead to the increase of demand for environmental auditing.

The remainder of the paper is organised as follows. Section 2 provides background and presents the research hypothesis. Section 3 describes the research methodology and presents empirical results. Section 4 concludes the paper.

## 2. Background and research hypothesis

In 1990/1991, the Egyptian government started its economic reform and restructuring program. The move towards free-market economy has been remarkably swift and the process of deregulation and privatization has stimulated activity in the stock market. One of these recent changes is beginning to pay much consideration

for environmental protection. The environmental situation in Egypt seriously constrains the national drive towards sustainable development. Degradation of natural resources is a significant threat to agriculture and tourism, as well as to continued economic growth. Air and water pollution, as well as improper waste disposal, furthermore, cause significant health problems, lower the quality of life, and even lead to increase mortality rates.

The protection of the environment, in the sense of ecologically rational management of natural resource, is perceived today as a necessary condition for social and economic development. Therefore, the Egyptian government established in 1994 the Ministry of State for Environmental Affairs (MSEA) and its executive arm, EEAA with the objective of integrating the environmental dimension into the national policies, plans, programs and projects and an immediate focus on the reduction of pollution rates for the protection of natural resources, biodiversity and the historical and cultural heritage, within the framework of sustainable development. The Egyptian government established the environmental law no. 4 of 1994 then its executive regulation in 1995.

The hypotheses for the study have been framed as follows;

- H1.** The environmental law no. 4 of 1994 can improve environmental awareness within Egyptian companies.
- H2.** The increase of environmental awareness can influence the demand for environmental auditing.
- H3.** Limited demand for environmental auditing is governed by the perception on disadvantages of environmental auditing conceived by companies.

## 3. Research method

The study is based on a survey of 158 Egyptian companies. The survey has been conducted in 2006 after more than 10 years of enacting the law no. 4 of 1994 in Egypt. The aim of this survey is to study the changes that may happen and their implications on auditing profession. The survey was attempted to collect data about three attributes, (1) environmental awareness within Egyptian companies (2) characteristics of environmental auditing. A number of the questions provided a space for the respondent to provide additional information. A number of questions on the survey were designed to determine the presence or absence of a specific issue, others were concerned with the magnitude of certain issues. The questionnaire was divided into three parts. The first segment requests data concerning demographic characteristics in order to obtain a profile of respondents. The second aims to provide information about environmental audits such as the importance of environmental issues for a company, types of environmental auditing conducted, whether these audits were conducted by internal or external personnel, and the perceived potential advantages and disadvantages of environmental auditing. The third part evaluates the level

of environmental awareness among Egyptian companies.

The statistical methodology in this study follows three stages. The primary stage was descriptive analysis. The purpose of this analysis is to describe the characteristics of certain groups of subjects (Norusis, 2000; Connolly and Slickin, 1971; Bowen and Starr, 1982). The data was examined further using the factor analysis. This was used to analyze interrelationships among a large number of variables and to explain these variables in terms of their common underlying factors (Stapleton, 2002; Rowe, 2002; Truker and Maccallum, 2002; Darligton; 2002; Gorsuch, 1983; Morrison, 1990; Kim and Mueller, 1987; Kline, 1994; Stevens, 1992; Reymontand and Joreskog, 1993). Finally, correlation and regression analysis was carried out as an important tool for social sciences in the analysis of non-experimental data (Berry and Feldman, 1985).

#### (a) Sample selection

The choice of the sample is dictated both by the specific objectives of the study and the nature of Egyptian market as well as data availability. This study depends on a random sample of companies, split into four industrial categories (30 cements -45 chemicals-33 pharmaceutical-50 petroleum companies). The segments were selected because their activities have a strong impact on the environment. The government in Egypt is beginning to pay significant attention to these activities. The numbers of working companies in any industrial sectors within Egypt is small, especially, if it is compared with the same industrial sector in Europe or the USA. This may be due to Egypt is a developing country and faces a number of economics and social problems. Also, Egypt is beginning the move towards a free-market economy and privatization in the 1990s. These changes may need time to create a new positive environment, which encourage investors to invest in Egypt. These numbers are not sufficient to conduct a completely balanced sample frame. (10 of 30 cements, response rate 33%, - 13 of 45 chemicals , response rate 29%, - 10 of 33 pharmaceuticals , response rate 30%, - 15 of 50 , response rate 30%, petroleum companies). Table (1) below presents the description of sample study:

Table (1) The description of sample study

Types of companies	Number of companies	Number of responding companies	Response rate
Cements	30	10	33%
Chemicals	45	13	29%
pharmaceuticals	33	10	30%
petroleum	50	15	30%
Totals	158	48	

#### (b) Empirical results

The results of the study are presented through three stages as follows:-

##### Stage (1): descriptive analysis

Respondents were asked if their companies made any changes to protect the environment. Approximately 67.5 % of companies have made many changes in their operations to protect the environment and comply with environmental laws, such as, fixing filters, adding new equipment and replacing the old, and putting in systems to treat waste. To evaluate current environmental state within a number of companies, respondents were asked about a number of matters, as in Table (2).

Over 39.6 of companies have reported the existence of a written corporate environmental policy statement. In 58 % of these companies, the board of directors set this statement and in 31 % of companies, the environmental affairs department issued it. 35 % of companies had a separate environmental budget. Only 12.5 % of companies had made appointments with environmental specialists to plan for environmental audits, while about 81 % of companies did not.

The data analysis of the survey indicated that nearly 65 % of companies conducted some types of environmental audits. The most common types of environmental audits were compliance with environmental laws, as shown in Table (3).



Table (2): Current environmental issues in companies

Questions	N	Percentage (%)
- Does your company have a written environmental policy statement?		
- Yes	19	39.6
- No	29	60.4
- Who set environmental statement inside your company?		
- Board of directors	28	58.3
- Management systems department	-	-
- Environmental affairs department	15	31.3
- Legal department	-	-
- Finance department	1	2.1
- Accounting and auditing department	-	-
- Is there a separate budget for environmental issues in your company?		
- Yes	17	35.4
- No	31	64.6
<b>-HAVE ANY OF THE FOLLOWING STAFF APPOINTMENTS BEEN MADE OR PLANNED IN CONNECTION WITH ENVIRONMENTAL AUDITS?</b>		
- <b>THE ENVIRONMENTAL CONSULTANCY FIRMS</b>	<b>2</b>	<b>4.2</b>
- Environmental specialists		
- External auditor	6	12.5
- Internal auditing staff	-	-
- Researcher	-	-
- Manager of management systems department	-	-
- No new appointments	2	4.2
	39	81.3

Table (3): Types of environmental audits conducted

Areas Audited	No.	Percentage (%)
-Compliance with environmental laws and reporting requirements	18	37.5
-Compliance with company environmental policies and procedures	9	18.8
-Environmental management systems	20	41.6
-The company's programs for the treatment, storage or disposal of hazardous waste or pollution prevention	19	39.6
-Financial accounting for environmental liabilities	7	14.6
-None	7	14.6

N.B: Some companies reported more than one type of environmental auditing



A summary of the respondents' perceptions of the magnitude of the potential advantages of environmental auditing is presented in Table (4). They used a 5-point scale with the value of 1 indicating no advantages and the value of 5 indicating maximum advantage. The lists of 10 potential advantages are presented in descending order based on the mean scores, which ranged from 3.75 to 2.56.

Respondents reported that the greatest disadvantage of environmental audits is the lack of financial and technical ability to solve environmental problems. They used a 5-point scale, as shown in Table (5).

### Stage (2): Factor analysis of the survey

The purpose of factor analysis is to discover simple patterns of relationships among the variables. In particular, it seeks to discover if the observed variables can be explained in terms of a smaller number of variables called factors (Stapleton, 2002; Rowe, 2002; Morrison, 1990; Truker and Maccallum, 2002; Kim and Mueller, 1978; Kline, 1994; Reymont and Joreskog, 1993; Stevens; 1992). Factor analysis is used to reduce the number of variables in the questions about: -types of environmental audits, -the potential advantages of environmental auditing and -the potential disadvantages of environmental auditing.

Respondents were asked to indicate the types of environmental audits, which their companies conducted. Factor analysis was used to reduce the set of 6 types of audits into three composed factors. Using the minimum Eigen value of one criterion, three factors were retained according to the Kaiser Criterion (Stapleton, 2002; Kim and Muller, 1978; Stevens, 1992), as shown in Table (6).

Types of environmental audits were loaded on three factors. Factor 1 reflects compliance audit, this is the most common form of environmental audits for companies because of the potential liabilities from violations of environmental regulatory. Compliance audit has centred on whether operations are in compliance with governmental regulations (CH<sub>2</sub>MHILL, 1993; Graves et al., 1996). Factor 2 explains other types of environmental auditing, reflecting whether a company has an environmental strategy and its systems operates properly to manage future environmental risks (Elkington and Jennings, 1991; CH<sub>2</sub>MHILL, 1993; Graves et al., 1996). Factor 3 reflects on mechanism auditing, which focuses on how the company's waste is treated, stored or disposed. The loading listed under the factor headings represents a correlation between that item and the overall

factor. Like Pearson correlations, they range from -1 to 1 (Darlington, 2002; Rowe, 2002). The number (0.87814) in the first column expresses the correlation between the variable "compliance with environmental laws and reporting requirements" and factor 1. It can be observed that the variable "environmental management systems" has three correlations with factor 1 (0.42104), factor 2 (0.64757) and factor 3 (0.30109). Because this variable is closely related to factor 2 (0.64757 > 0.42104 and 0.30109), it is loaded on factor 2. An Eigen value is the amount of variance explained by factors (Stapleton, 2002; Morrison, 1990; Truker and Maccallum, 2002; Darlington, 2002). The Eigen value (2.01141) in the first column represents the amount of variance explained by factor 1, which accounted for 33.5 % of the variance in the original set of variables.

Respondents were asked to indicate the potential advantages of conducting environmental audits. The list of 10 advantages was used. The results of the factor analysis of the variables measuring the magnitude of the potential advantages of conducting environmental audits are shown in Table (7).

The first factor is marked by high loadings on "the corporate image" items. It reflects the benefits, which a company can gain from a positive image arising from environmental protection (Brown and Deegan, 1998; Mathews, 1993; Lindblom, 1994; Hooghiestra, 2000). The second factor is marked by high loadings on "environmental risks" items. It reflects financial benefits arising from compliance with environmental regulations. The third factor loaded on "legitimacy of a company" items. It represents environmental awareness. The numbers of columns (such as, 0.75699, 0.75497 and 0.57585 and 0.50433) in first column represent the correlation between factor 1 and each variable loaded on this factor. It can be observed that the variable "increased assurance of adequacy of financial accruals for environmental liabilities" is related to factor 1 (0.4073), factor 3 (0.34241) but it has a high factor loading on the factor 2 (0.49898). Factor 1 explains the variance in the original set of variables 24.5 % of the variance in the original set of variables.

Respondents were asked to indicate the potential disadvantages of conducting environmental audits. The list of 5 disadvantages was used. The results of the factor analysis of the variables measuring the magnitude of the potential advantages of conducting environmental audits are shown in Table (8). Using the minimum Eigen value of one criterion, two factors were retained.



Table (4): The potential advantages of environmental auditing

The potential advantages of environmental auditing	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Coefficient of Variation (SD/Mean) (%)</i>
-Reduction of fines for non-compliance with environmental regulations	48	3.75	0.98	26.0931
-Demonstrate that a company is operating according to the requirements of environmental laws	48	3.71	0.85	22.9076
-Create a good corporate image	48	3.65	1.06	29.1210
-Increased assurance of the adequacy of financial accruals for environmental liabilities	48	3.48	1.03	29.6395
-Publicise the commitment to environmental regulation	48	3.40	0.89	26.2966
-Increased early identification of issues and problems	48	3.40	1.09	31.9941
-Reduction of long term environmental risks	48	3.38	0.98	29.0728
-Increased company awareness of environmental issues	48	3.19	1.27	39.7132
-Cost savings from waste minimisation and pollution prevention	48	2.92	0.94	32.2819
-Increased environmental protection	48	2.56	0.99	38.5282

Table (5): The potential disadvantages of environmental audits

The potential disadvantages of environmental auditing	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Coefficient of Variation (SD/Mean) (%)</i>
-Lack of Financial and /or technical ability to solve environmental problems	48	4.02	0.96	23.7829
-Use of environmental auditing reports against the company in regulatory enforcement action	48	3.98	0.84	21.0513
-Loss of public trust if environmental problems are discovered	48	3.31	0.95	28.6437
-Decreased market share of company if environmental problems are discovered	48	3.10	0.95	30.6263
-Increase the cost of auditing processes	48	3.00	1.09	36.3851



Table (6): Types of environmental audits

<i>Audit Area (Variables)</i>	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>
	<i>Compliance with regulation</i>	<i>Environmental liabilities and systems</i>	<i>The company's environmental program</i>
-Compliance with environmental laws and reporting requirements	0.87814		
-Compliance with company environmental policies and procedures		0.77934	
-Financial accounting for environmental liabilities		0.68889	
-Environmental management systems	0.42104	0.64757	-0.30109
-The company's programs for the treatment, storage or disposal of hazardous wastes of pollution prevention			0.96934
Eigen value	2.01141	1.26533	1.14253
Percent of Variance	33.5	21.1	19.0
Percent of total Variance	33.5	54.6	73.7

Table (7): The potential advantages of environmental auditing

<i>Potential advantages of environmental auditing (Variables)</i>	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>
	<i>The corporate image</i>	<i>Environmental risks</i>	<i>The legitimacy of a company</i>
-Create a positive corporate image	0.75699		
-Publicise the commitment to environment	0.75497		
-Cost savings from waste minimization and pollution prevention	0.57585		
-Increase company awareness of environmental issues	0.50433		
-Increase early identification of issues and problems before regulatory enforcement action		0.75174	
-Reduction of fines for non-compliance with environmental regulations		0.6966	
-Reduction of long-term environmental risks		0.65105	0.4741



-Increased assurance of the adequacy of financial accruals for environmental liabilities	0.4073	0.49898	0.34241
-Increased environmental protection provide evidence a company is operating according to the requirements of environmental laws	0.38087		0.85602 -0.70590
Eigen value	2.44774	2.08643	1.25975
Percent of Variance	24.5	20.9	12.6
Percent of total Variance	24.5	45.3	57.9

Table (8): The potential disadvantages of environmental audits

<i>Potential disadvantages of environmental auditing</i>	<i>Factor 1</i>	<i>Factor 2</i>
	<i>The sustainability of a company</i>	<i>inability to solve environmental problems</i>
-Loss of public trust if environmental problems are discovered	0.91624	
-Decreased market share of company if environmental problems are discovered	0.83229	
-Increased the cost of auditing processes	0.69757	
-Use of environmental auditing reports against the company in regulatory enforcement action		-0.74575
-Lack of financial and/or technical ability to solve environmental problems	0.34420	0.65218
Eigen value	2.19317	1.02727
Percent of Variance	43.9	20.5
Percent of total Variance	43.9	64.4





Table (9): Correlation between the obstacles to the external auditor’s involvement in environmental auditing and environmental auditing variables (second attribute)

<b>Second attribute:- Environmental auditing</b>	<b>OEAEA</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>-Types of environmental audits(factor scores):-</b> <b>1- Environmental systems and compliance</b>	-0.302									
<b>2- Environmental liabilities</b>	-0.004	-0.076								
<b>3- Environmental policies</b>	-0.118	0.459*	-0.123							
<b>-Potential advantages of environmental auditing (factor scores)</b> <b>4- Environmental risks</b>	0.016	-0.226	0.062	- 0.229						
<b>5- Legitimacy of a company</b>	-0.443*	0.048	0.088	- 0.088	0.118					
<b>6- The corporate image</b>	0.190	-0.281	-0.119	- 0.277	0.289	0.199				
<b>-Potential disadvantages of environmental auditing (factor scores)</b> <b>7- Lack of environmental audits’ requirements</b>	-0.131	0.000	-0.323	0.194	- 0.143	-0.104	- 0.250			
<b>8- Environmental problems threat the sustainability of a company</b>	- 0.569**	0.200	0.157	0.149	0.103	0.679**	- 0.035	0.102		
<b>-Companies’ motivations for environmental disclosure (factor scores)</b> <b>9- Publicizing regulatory compliance</b>	0.080	0.094	0.091	- 0.173	0.138	-0.405*	- 0.168	0.104	- 0.506**	
<b>10- Competitive advantages</b>	0.059	0.151	- 0.438*	0.208	0.169	-0.217	- 0.130	0.284	-0.211	0.146
<b>11- Environmental awareness</b>	-0.075	0.227	-0.162	0.104	0.028	-0.025	- 0.138	0.000	0.159	0.119



Table (10): Correlations between the demand for environmental auditing and characteristics of environmental auditing (Second attribute)

Second attribute:- the characteristics of environmental auditing	the demand for environmental auditing	1	2	3	4	5	6	7	8
-Types of environmental audits(factor score):- 1-compliance with Regulation	0.124								
2-environmental liabilities and systems	0.526**	0.152							
3-the company' environmental program	0.183	-0.180	- 0.021						
-Potential advantages of environmental auditing (factor scores) 4-the corporate image	0.192	0.179	0.182	0.170					
5-environmental risks	0.342*	0.000	0.216	0.920	0.136				
6-legitimacy of a company	0.254*	-0.063	0.358 *	0.236 *	0.351 *	0.449* *			
-Potential disadvantages of environmental auditing (factor scores) 7- the sustainability of a company	0.202	0.127	0.234	-0.05	0.233	0.052	0.078		
8- inability to solve environmental problems	-0.033	0.238*	0.056	- 0.103	0.149	0.303*	0.366**	0.248 *	
Significance level of ** P = 0.01, * P = 0.05									

Table (11): The regression model of survey

Variables	Coefficient of variance	Standard error	T-test	
			Value	Significance
-Environmental affairs department (A)	1.11008	0.33609	3.303	0.0028
- inability to solve environmental problems (factor score) (B)	-0.63819	0.20782	-3.071	0.0050
Constant (C)	3.43942			
Dependent variable:- the demand for environmental auditing.				
F- value for model : 9.60049			F-significance: 0.0008	
Model equation:-				
Dependent variable = C + 1.11008 A - 0.63819 B				
Dependent variable = 3.43942 + 1.11008 A - 0.63819 B				

The potential disadvantages of environmental auditing are composed into two aspects. "The sustainability of a company" is factor 1 and "inability to solve environmental problems" is factor 2. The Eigen value of factor 1 (2.191317) represents 43.9 % of the variance in the original set of variables. Factor 1 explains variable, which is related to a company's behavior towards the environment. This factor reflects the impact of a negative publicity on the sustainability of an offending company (see for example, Rosthorn, 2000; Hooghiemstra, 2000; Deegan and Rankin, 1996). Factor 2 reflects the reasons which make a number of companies prefer not to conduct environmental auditing. They may face troubles with governmental agencies if they have environmental problems or their reputation may be threaten (Deegan et al., 2002; Milne and Patten, 2002; Deegan and Rankin, 1999). On the other hand, environmental auditing needs a number of requirements, such as financial resources, qualified staff and a multi disciplinary team (see for example, ICAEW, 1992, 2000; FEE, 1993, 1995; Collison and Gray, 1997; IFAC, 1995). It can be argued that the demand for environmental auditing depends on whether companies prefer not to conduct this audit and whether they have the requirements of environmental auditing.

The results of factor analysis reduced the original set of variables from 21 variables into 8 composed factors, which are used in the correlation and regression analysis.

### Stage (3): the correlation and regression analysis

#### The correlation analysis

Pearson correlations focused on the relationship between the dependent variable, which is the demand for environmental auditing and the independent variables. The analysis included two matrices as follows:-

#### (a) Matrix I

The matrix presents the relationship between the dependent variable in the first column of matrix and the independent variables, which describe environmental awareness of companies (first attribute in this study), as shown in Table (9).

It can be observed that most of the independent variables in matrix (1), which reflected the companies' interest towards the environment, were positively correlated with the dependent variable. For example, a number of companies made some changes to their operations for environmental protection and compliance with law, such as, fixing filters, and adding new equipment. Other companies had environmental policy statements, separate budgets for environmental issues and environmental affairs departments. The existences of such matters can indicate the impact of environmental issues on business. On the other hand, the other independent variables in the matrix, which explored the deficiency of environmental awareness of companies, reported negative correlations with the dependent variable, for example, a number of companies did not make any changes to their operations to protect the environment. Companies' agreements with environmental consultancy firms to perform environmental audits reported a negative association with the dependent variable. Consultancy firms dominate the



environmental services market; they have the financial and technical ability to provide these services.

The variable relating to an environmental specialist reported a positive correlation with the dependent variable, which may be explained on the basis that environmental auditing needs a multidisciplinary team and one of this team is the environmental specialist who will be responsible for environmental techniques.

#### **(b) Matrix (2)**

This sets out the correlations between the demand for environmental auditing, which represents the dependent variable in the first column of matrix, and the characteristics of environmental auditing (the second attribute), which represent the independent variables (as shown in Table 10).

Positive correlations were reported between the factor scores reflecting the types of environmental audits and the dependent variable. The factor, environmental liabilities and system, had the strongest association with dependent variable with a correlation of 0.526 at the high significance of 0.01. This is due to a number of companies in Egypt, particularly within petroleum and pharmaceutical industries who have environmental budget and also an environmental management department, which are audited by external auditors. The most common types of environmental audits in Egypt are concerning with the environmental liabilities and systems.

The factor scores reflecting the potential advantages of environmental auditing reported positive correlations with the dependent variable. Since these advantages include increased companies' awareness of environmental issues. Companies may seek to conduct environmental auditing to gain its benefits, which may increase the demand for environmental audits. However, the factor scores reflecting potential disadvantages of environmental auditing had two different correlations as follows:-

-The first factor, the sustainability of a company, reported a positive correlation with the dependent variable. This may be due to the fact that the environment seriously impacts on business. If a company does not bear its responsibility towards the environment and non-compliance with regulation, it may be fined, lose its reputation or shut down. Therefore, a company may seek to create a good image by conducting environmental auditing.

The second factor, inability to solve environmental problems, reported a negative correlation with the dependent variable. This can be explained in that some companies may prefer not to engage in environmental audits because they fear a loss of reputation or exposure to regulatory actions if the environmental problems are discovered. Other companies

may not have the financial and technical ability to solve environmental problems. They ignore environmental issues, which may reduce or limit the demand for environmental auditing.

#### ***The regression model of survey***

Designing the descriptive model of survey was based on the following procedures:- regression analysis determines how much does variation in one variable relates to variation in another variable and what is the shape of the relation between the two variables (Rice, 1995; Snedecor and Cochran, 1971; Bowen and Starr, 1982; Jaccard et al., 1990). The purpose of the regression analysis in this study is to analyze the relationship between the dependent variable and independent variables. The Stepwise regression analysis was used as a tool to assist in selecting the independent variables for the model. The variables presented in the two correlations matrices in Table (9) and (10) comprised the initial set of potential independent variables. These variables included environmental awareness (first attribute) and characteristics of environmental auditing (second attribute). The missing values for any variables in the model were omitted from the analysis. Variables with a low number of responses were eliminated from the independent variables set. Also, variables with quite low correlations with the dependent variable were eliminated from the model. The significance level for including a variable in the model was the 0.05 level. As a result of the elimination, two variables remained in the independent variables set. The regression model of companies is presented in Table (11).

One variable, environmental affairs department was included in the first attribute variables representing environmental awareness of companies. It was an original variable and was significant in the model at the P-value of 0.028. It can be argued that the increased environmental awareness of companies may help to increase the importance of environmental audits, which may reflect positively on the demand for environmental auditing. The existence of an environmental affairs department in any company could be considered as a sign of environmental awareness. This department can inform management of a company about environmental issues related to company's operations. Also, it can inform or train employees of the company to perform their activities in an environmentally responsible way. Perhaps, it is a means of expressing the commitment of top management regarding environmental protection.

On the other hand, the composite variable, which is the inability to solve environmental problems, was significant in the model at the P-value of 0.005. The variable was the respondents' factor scores for the factor 2 extracted in the factor analysis of the potential disadvantages of environmental auditing. It was



interpreted as representing companies who prefer not to conduct environmental auditing because they fear from using environmental reports against them, which may expose them to regulatory actions or may loss of the public trust or reputation if environmental problems are discovered. A company's lack of technical and financial ability, such as lack of qualified staff, is the most important barrier, which prevent a company to conduct environmental auditing. In other words, this factor represents aspects, which reduce or make the demand for environmental auditing is limited. Therefore, this composite variable indicated a negative association with the demand for environmental auditing (the dependent variable). It can be argued that according to the results of the model, the demand for environmental auditing depends on environmental awareness within companies and their ability to solve environmental problems.

#### 4. Conclusions

The results of empirical study indicated that environmental issues have a strong impact on business and their importance is increasing. A number of companies have made many changes on their operations to protect the environment and to comply with environmental laws. The existences of such matters indicate the increase in companies' awareness of the environment, which may be reflected positively on the demand for environmental auditing. Environmental awareness within companies in Egypt still needs to be raised. A number of companies conducted some types of environmental auditing. The most common type of this audit was in the area of compliance with environmental laws and environmental management systems. This may be due to all companies in Egypt now being forced by law to keep environmental records. These records became legal records. A number of companies have environmental management systems and a budget for environmental issues. These companies, audit environmental systems according to conventional audit process without using specific procedures or disclosing an opinion concerning environmental issues in the audit report. Most responding companies reported that they try to avoid environmental auditing because environmental disclosure may causes problems for them. The level of demand for environmental auditing by companies in Egypt is low. Environmental law no. 4 (1994) does not force companies in Egypt to conduct environmental auditing but it is voluntary. Respondents reported that the potential advantages of environmental auditing is related to, first financial reasons such as reducing fines, second sustainability and creating a positive image, which can help companies to gain competitive advantages. The potential disadvantages of environmental audits are related to lack of requirements of these audits and the desire of companies to keep their reputation.

#### 5. Limitations and future research

In Egypt empirical studies undertaken with companies have revealed that research access is problematic. Companies have restricted access to their information, particularly policies and procedures, which they perceive, may be useful to their competitors. In a number of companies, access has been provided on the condition that the company's anonymity will be maintained in all research reference. In selecting a research design the potential posed by the nature of Egyptian market and data availability. However, the limitations of this study can provide anchors for future research. The study included only four types of industries. It may be extended by surveying other types of industries.

#### REFERENCES

- [1]. Adams, C.A., Coutts, A. Harte, G., 1995. Corporate equal opportunities (non-disclosure), *British Accounting Review*, 27 (2), 87-108.
- [2]. Adams, C.A., Hill, W., Roberts, C.1998. Corporate social reporting practices in Western Europe: legitimating corporate behavior, *British Accounting Review*, 30(1), 1-21., , ,
- [3]. Andreassen, T., Lindestad, B., 1998. Customer loyalty and complex services-the impact of corporate image on quality, customer satisfaction and loyalty for customers with varying degrees of service expertise, *International Journal of Service Industry Management*, 9(1), 7-15., , , [3], Andreassen, T., Lindestad, B., 1998. Customer loyalty and complex services-the impact of corporate image on quality, customer satisfaction and loyalty for customers with varying degrees of service expertise, *International Journal of Service Industry Management*, 9(1), 7-15.
- [4]. (APB) Auditing Practices Board, 1995. SAS<sub>520</sub> using the work of an expert, London, APB., , , [4], (APB) Auditing Practices Board, 1995. SAS<sub>520</sub> using the work of an expert, London, APB.
- [5]. (APB) Auditing Practices Board, 1993. Exposure draft of a statement of auditing standards, "ASA<sub>600</sub> Auditors' Reports on Financial Statements, May, London, APB.
- [6]. (APB) Auditing Practices Board, 1993. Exposure draft of a statement of auditing standards, "ASA<sub>600</sub> Auditors' Reports on Financial Statements, May, London, APB.
- [7]. (APC) The Auditing Practices Committee, 1991. Auditing guideline the auditor's responsibility in relation to illegal acts, Exposure Draft, London, Auditing Practice Committee of CCAB Limited.
- [8]. Bansal, P., Roth, K., 2000. Why companies go green: a model of ecological responsiveness, *Academy of Management Journal*, 43(4), 717-736.
- [9]. Black. R., 1998. A new leaf in environmental auditing, *The Environmental Auditor*, 55(3), 24-27.
- [10]. Berry, W., Feldman, S., 1985. *Multiple regression in practices*, London, Sage Publications.
- [11]. Boland, E.W., 1988. Environmental auditing can minimise the risks of not being compliance and not knowing it, *Textile Chemist and Colourist*, 20(3), 27-29.
- [12]. Bowen, E.K., Starr, M.K., 1982. *Basic statistics for*



- business and economics, New York, McGraw-Hill Book Company.
- [13]. Brinkmann, J., Sims, R.R., 2001. Stakeholder-sensitive business ethics teaching, Teaching
- [14]. Brown, N., Deegan, C., 1998. The public disclosure of environmental performance information-a dual test of media agenda setting theory and legitimacy theory, *Accounting and Business Research*, 29(1), Winter, 21-41.
- [15]. Buhr, N., 1998. Environmental performance, legislation and annual report disclosure: the case of acid rain and flaconbridge, *Accounting, Auditing and Accountability Journal*, 11(2), 163-190.
- [16]. CH<sub>2</sub>MHILL, 1993. The role of internal auditors in environmental issues, Altamonte, Springs, Florida, The Institute of Internal Auditors Research Foundation.
- [17]. (CICA) The Canadian Institute of Chartered Accountants, 1997. Full cost accounting from an environmental perspective, Toronto, CICA.
- [18]. (CICA) The Canadian Institute of Chartered Accountants, 1994. Reporting on environmental performance, Toronto, CICA.
- [19]. (CICA) The Canadian Institute of Chartered Accountants, 1993. Environmental costs and liabilities: accounting and financial reporting issues, Toronto, CICA.
- [20]. (CICA) The Canadian Institute of Chartered Accountants, 1992. Environmental auditing and the role of the accounting profession, Toronto, CICA.
- [21]. Collison, D., Gray, R., Innes, J., 1996. The financial auditor and the environment, London, Institute of Chartered Accountants in England and Wales (ICAEW).
- [22]. Collison, D., Gray, R., 1997. Auditor's responses to emerging issues: a UK perspective on the statutory financial auditor and the environment, *International Journal of Auditing*, 1(2), 135-149.
- [23]. Collison, D., Slomp, S., 2000. Environmental accounting, auditing and reporting in Europe: the role of FEE, *The European Accounting Review*, 9(1), 111-129.
- [24]. Connolly, T.G., Sluckin, W., 1971. An introduction to statistics for the social sciences, Third Edition, London, Macmillan Press Ltd.
- [25]. Coopers and Lybrand, 1993. Business and the environment: an executive guide, (Sydney: Coopers & Lybrand.
- [26]. Darlington, R.B., 2002. Factor Analysis, (<http://www.psych.cornell.edu/Darlington/factor.htm>)
- [27]. Deegan, C., 2002. Introduction the legitimising effect of social and environmental disclosures- a theoretical foundation, *Accounting, Auditing and Accountability Journal*, 15(3), 282-311.
- [28]. Deegan, C., Gordan, B., 1996. A study of the environmental disclosure practices of Australian corporations, *Accounting and Business Research*, 26(3), 187-199.
- [29]. Deegan, C., Rankin, M., 1996. Do Australian companies report environmental news objectively?, an analysis of environmental disclosures by firms prosecuted successfully by the environmental protection authority, *Accounting, Auditing, and Accountability Journal*, 9(2), 50-67.
- [30]. Deegan, C., Rankin, M., 1999. The environmental reporting expectations gap: Australian evidence, *British Accounting Review*, 31, 313-349.
- [31]. Deegan, C., Rankin, M., 1997. The materiality of environmental information to users of accounting reports, *Accounting, Auditing and Accountability Journal*, 10(4), 562-583.
- [32]. Deegan, C., Rankin, M., Tobin, J., 2002. An examination of the corporate social and environmental disclosures of BHP from 1983-1997- a test of legitimacy theory, *Accounting, Auditing and Accountability Journal*, 15(3), 312-343.
- [33]. Deegan, C., Rankin, M., Voght, P., 2002. Firms' disclosure reactions to major social incidents: Australian evidence, *Accounting Forum*, 24(1), 101-130.
- [34]. Dixon, R., Mousa, G.A., Woodhead, 2004. The necessary characteristics of environmental auditors: a review of the contribution of the financial auditing profession, *Accounting Forum*.
- [35]. Dowling, J., Pfeffer, J., 1975. Organizational legitimacy societal values and organizational behavior, *Pacific Sociological Review*, 18(1), January, 122-136.
- [36]. Drummond, J., Bain, B., 1994. Managing business ethics: a reader on business ethics for managers and students, Butterworth-Heinemann Ltd.
- [37]. Elkington, J., Jennings, V., 1991. The rise of the environmental audit, *Integrated Environmental Management*, 6, 8-10.
- [38]. (FEE) Fédération des Experts Comptables Européens, 1993. Environmental accounting and auditing: a survey of Current activities and developments, Brussels, FEE.
- [39]. (FEE) Fédération des Experts Comptables Européens, 1995,. Environmental accounting reporting and auditing: a survey of current activities and developments within the accountancy profession, Brussels, FEE.
- [40]. (FEE) Fédération des Experts Comptables Européens, 1998. European accountancy profession units on environmental issues, Brussels, FEE Information Sheet.
- [41]. Fombrun, C., 1996. Reputation: realising value from the corporate image, (Boston: Harvard Business School Press.
- [42]. Gatewood, R., Gowan M. Lautenschlager G., 1993. Corporate image, recruitment image, and initial job choice decisions, *Academy of Management Journal*, 36(2), April, 414-427.
- [43]. Gorsuch, R., 1983. Factor analysis, Hillsdale, NJ: Erlbaum.
- [44]. Graves, O.F., Flesher, D.L., Jordon, R.E., 1996. Pictures and the bottom line: the television epistemology of US annual reports, *Accounting Organization and Society*, 21 (1) Jan., 57-88.
- [45]. Gray, R., Kouhy, R., Lavers, S., 1995. Corporate social and environmental reporting: a review of the literature and a longitudinal study of UK disclosure,



- Accounting, Auditing, and Accountability Journal, 8(2), 47-77.
- [46]. Gray, R., Symon, I., 1992. An environmental audit by any other name, *Integrated Environmental Management*, 6, 9-11.
- [47]. Gray, R., Bebbington, J., Walters, D., 1993. Accounting for environment-the greening of accountancy, Part II", London, The Chartered Association of Certified Accountants, Paul & Chapman Publishing Ltd.
- [48]. Grice, B., 1992. Pushing a degree of ethics and history, *Business Review Weekly*, 13 November, Australia.
- [49]. Guthrie, J., Parker, L., 1989. Corporate social reporting a rebuttal of legitimacy theory, *Accounting and Business Research*, 19(76), 343-352.
- [50]. Herremans, I.M., Akathaporn, P., McInnes, M., 1993. An investigation of corporate social responsibility reputation and economic performance, *Accounting, Organizations and Society*, 18(7/8), 587-604.
- [51]. Hillary, R., 1993. *The eco-management and audit scheme: a practical guide*, Letchworth, UK, Technical Communications Publishing Ltd.
- [52]. Hooghiemstra, R., 2000. Corporate communication and impression management-new perspectives why companies engage in corporate social reporting, *Journal of Business Ethics*, 27., 55-68.
- [53]. Huizing, A., Dekker, H., 1992. The environmental issue on the Dutch political market, *Accounting, Organizations and Society*, 17, 427-448.
- [54]. (ICAEW) Institute of Chartered Accountants in England and Wales, 1992. *Business accountancy and the environment: a policy and research agenda*, London, ICAEW.
- [55]. (ICAEW) The Institute of Chartered Accountants in England and Wales, 2000. *Environmental issues in the audit of financial statements*, London, ICAEW.
- [56]. (ICC) International Chamber of Commerce, 1991. *ICC guide to effective environmental auditing*, Paris, France, ICC Publishing S. A.
- [57]. (IFAC) International Federation of Accountants Committee, 1995. *Discussion paper: the audit profession and the environment*, New York, IFAC.
- [58]. Jaccard, J., Turrisi, R., Wan, C., 1990. *Interaction effects in multiple regression*, U.S.A, Sage Publications, Inc.
- [59]. Kenneth, E., John, M., 1982. Can a corporation have a conscience, *Harvard Business Review*, Vol. 60, Jan.-Feb., 132-142.
- [60]. Kim, J., Mueller, C., 1987. *Introduction to factor analysis*, Beverly Hills, Sage Publications.
- [61]. Kline, P., 1994. *An easy guide to factor analysis*, London, Routledge.
- [62]. Law no. 1994, 2002. <http://www.eeaa/english/main>.
- [63]. Lindblom, C.K., 1994. The implications of organizational legitimacy for corporate social performance and disclosure, Paper Presented at the Critical Perspectives on Accounting Conference, New York: Ny.
- [64]. Maltby, J., 1995. Environmental audit: theory and practices, *Managerial Auditing Journal*, 10(8), 15-26.
- [65]. Mason, R., Mason, F., Culunan, M., 1995. *Ethics of information management*, London, Sage Publications, Inc.
- [66]. Mathews, M.R., 1993. *Socially responsible accounting*, London: Chapman –Hall.
- [67]. Mathews, M.R., 1997. Twenty-five years of social and environmental accounting research. is there a silver jubilee to celebrate?", *Accounting, Auditing and Accountability Journal*, 10(4), 481-531.
- [68]. Mathews, M., 2001. Some thoughts on social and environmental accounting education, *Accounting Education-An International Journal*, 10(4), 335-352.
- [69]. McMurray, S., 1992. Monsanto doubles liability provision for treating toxic waste to \$ 245 million, *Wall Street Journal (WSJ)*, March 23, A7.
- [70]. Mendenhall, and Sincich, 1992. The data produced by the federal trade commission- it was submitted by Lauren McIntyre, Department of Statistics, North Carolina State University, (gopher:\\jse.stat.ncsu.edu\\11\\jse).
- [71]. Milne, M., Patten, D., 2002. Securing organisational legitimacy – an experimental decision case examining the impact of environmental disclosures, *Accounting, Auditing, and Accountability Journal*, 15(3), 372-405.
- [72]. Milne, M., 2001. Commentary on: some thoughts on social and environmental accounting education, *Accounting Education*, 10(4), 369-374.
- [73]. Milner, D., Mahaffey, T., Macauley, K., Hynes, T., 1999. The effect of business education on the ethics of students: an empirical assessment controlling for maturation, *Teaching Business Ethics*, 3(3), 255-267.
- [74]. Morrison, D., 1990 *Multivariate statistical methods*, New York, McGraw-Hill.
- [75]. Naj, A. K., 1990. Some companies cut pollution by altering production methods, *Wall Street Journal*, 24, December, 1.
- [76]. Natale, S., Ford, J., 1995. The social audit and ethics, *Management Auditing*, 9(1), 29-3
- [77]. Neu, D., Warsame, H., Pedwell, K., 1998. Managing public impressions: environmental disclosures in annual reports, *Accounting, Organizations and Society*, 23, 265-282.
- [78]. Norusis, M.J., 2000. *SPSS 10.0 guide to data analysis*, London, Prentice Hall, Inc.
- [79]. O'Donovan, G., 2002. Environmental disclosures in the annual report the applicability and predictive power of legitimacy theory, *Accounting, Auditing and Accountability Journal*, 15(3), 344-371.
- [80]. O'Donovan, G., 1997. Legitimacy theory and corporate environmental disclosure: some case study evidence, Paper presented at Accounting Association of Australia and Newzealand Annual Conference, Hobart, July.
- [81]. Patten, D.M., 1992. Intra-industry environmental disclosures in response to the Alaskan Oil Spill: a note on legitimacy theory, *Accounting, Organizations and Society*, 17(5), 471-475.
- [82]. Patten, D.M., 1991. Exposure, legitimacy, and social disclosure, *Journal of Accounting and Public Policy*, 10(4), 297-308.
- [83]. Peter, F.D., 1981. What is business ethics?, *The Public Interest*, (63), Spring, 18-36.



- [84]. Reich, R., 1998. The new meaning of corporate social responsibility, *California Management Review*, 40(2), Winter, 8-17.
- [85]. Reymont, R., Joreskog, K., 1993. *Applied factor analysis in the natural sciences*, New York, Cambridge University Press.
- [86]. Rice, J.A., 1995. *Mathematical statistics and data analysis*, Second Edition, Belmont, Wadsworth Publishing Company.
- [87]. Rosthorn, J., 2000. Business ethics auditing-more than a stakeholder's toy, *Journal of Business Ethics*, 27, 9-19.
- [88]. Roussey, R.S., 1992. Practice note: auditing environmental liabilities, *Auditing: A Journal of Practice and Theory*, Spring, 11(1), 47-57.
- [89]. Rowe, D.B., 2002. Bayesian Factor Analysis, (<http://varda.biophysics.mcw.edu/~dbrowe/BFA.htm>)
- [90]. Sanehi, A., Waire, A., 1991. Audit to test green credentials, *Financial Times*, 8 August.
- [91]. Schaltegger, S., Muller, K., Hindrichsen, H., 1996. *Corporate environmental accounting*, Chichester, England, John Wiley & Sons
- [92]. Shields, D., Boer, G., 1997. Research in environmental accounting, *Journal of Accounting and Public Policy*, 16(2), Summer, 117-125.
- [93]. Snedecor, G., Cochran, W., 1971. *Statistical methods*, Sixth Edition, U.S.A., the IOWA State University Press.
- [94]. Specht, L.B., 1992. The auditor SAS 54 and environmental violations, *Journal of Accountancy*, December, 69-79.
- [95]. Stapleton, C.D., 2002. Basic concepts in exploratory factor analysis (EFA) as a tool to evaluate score validity: a right-brained approach, <http://erical.net/ft/tamu/Efa/htm>.
- [96]. Sterling, R., 1973. Accounting research, education and practice, *The Journal of Accountancy*, September, 44-52.
- [97]. Stevens, J., 1992. *Applied multivariate statistics for the social sciences*, Second Edition, Hillsdale, NJ, Erlbaum.
- [98]. Tucker, L., MacCallum, R., 2002. Exploratory factor analysis", <http://quantrm2.psy.ohiostate.edu/maccallum/factornew.htm>
- Weisberg, S., 1985. *Applied linear regression*, Second Edition, New York, John Wiley & Sons.