The Factors Affecting the Adoption of Enviromental Management Accounting in the Oil Refining and Petrochemical Companies with Structural Equation Modeling Aprpoach

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A B S T R A C T

Introduction: Today, businesses must focus on profits on the one hand and social and environmental issues on the other hand to make balance between them. Conservation and sustainability are increasingly dependent on observance of corporate social responsibilities. For this reason, business units report on their sustainability and environmental accounting. The aim of this study was to examine and model the factors influencing the use of environmental management accounting tools from the points of view of financial managers and assistants who are in the oil refining and petrochemical companies.

Method: The method used in this study was based on a descriptive survey and its design was quasi-experimental. For the field of study, a questionnaire including 5 general and 31 specific questions was used. The population consisted of financial administrators and assistants in oil refining and petrochemical companies, a subsidiary of the national oil company. There was no sampling method used and we tested the whole society including 182 people. To evaluate the reliability of the questionnaire, Cronbach's Alpha and spilit-half were used. The measurement tools used in the study were reliable and none of the questions was removed.

One sample t-test, Pearson correlation, confirmatory factor analysis, path analysis, structural equation modeling, two sample T-test and analysis of variance were performed by using LISREL and SPSS software.

Results: The result of this test by using confirmatory factor analysis and structural equation test showed that the significance level of all the factors were larger than 1/96 and all the routes specified in the model were significant. Culture of the society in dealing with environmental issues, with a significance level of 5/54, had the greatest impact among the factors influencing the use of environmental management accounting tools.

Conclusion: According to the results of the study, it is recommended that, by using personality tools, the right people should be appointed in organizational position in that agency to implement environmental management accounting and it is necessary to establish the use of tools in reducing environmental pollution.

Keywords: EMA, Culture, Standard

Introduction

The business environment is continuously changing. Ahadiat (2008) proposes that this growth is because of globalization, increasing information technology, new rules on corporate governance, and other democrats (1). These changes have had a significant impact on the role of management accounting (2).What should we care about is that the new situation requires new methods in accordance with the inevitable changes and developments. Therefore, all systems of management accounting is expected to adapt to their new situation and, if possible, go beyond the current situation (3).

One of the issues raised recently in the field of management accounting has been environmental management accounting. In the past, the environment was seemingly not considered in economic discussions. Pressure exerted on the organizations in order to force them to minimize environmental damages and costs was not observed (4). Now, the situation has changed. Environmental performance of the organization pays special attention to internal and external stakeholders and a major challenge and concern has been brought to accounting (5). Because of social concerns about the environment, organizations

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are by force faced with the fact that they have no inherent right to the environment and shall be responsible for the environmental consequences (6). Disclosure of information related to environmental costs increases the reliability and social status of firms and it can be an effective tool to achieve competitive advantage (7). Ramezani Ghavam Abadi (2012) believes that one of the main problems and obstacles in the field of environmental protection is lack of awareness and information among all layers of society (8). According to Salavati, reasons for employees' resistance to organizational change are: fear of failure, habits, lack of obvious need, loss of control, fear of a support system, closed mind, a lack of willingness to learn, fear of the new method not being better, and fear of the effects of individual characteristic (9).

This study sought to identify and model the factors influencing the use of environmental management accounting tools in petrochemical and oil refining companies as one of the most polluting industries in the country. Among the influencing factors, resistance to change, lack of established procedures regarding the collection and allocation of environmental costs, lack of standards as internal factors, competitive environment, and the culture of the society in dealing with environmental issues as external factors will be examined and tested.

Method

The method of this study was based on a descriptive survey and its design was quasi-experimental. As far as the theoretical part is concerned, the necessary information was gathered from books, journals and internet websites. For the field study, a questionnaire including 5 general and 31 specific questions was used. To ascertain the validity of the questions, the researchers corrected the questions through several sessions based on the expert opinion. As a result, the questionnaire is a valid one. To evaluate the reliability of the questionnaire, we used Cronbach's Alpha and spilit-half. Because the observed coefficients were above 70% for all of the cases, the measurement tools used in the study were reliable and none of the questions was removed.

The population consisted of financial administrators and assistants in oil refining and petrochemical companies, a subsidiary of the national oil company. There was no sampling method used and we tested the whole society.

Due to the possibility that some of the questionnaires do not return, 200 questionnaires were distributed among the population directly. Of the questionnaires distributed, 160 (85% of sample) were returned.

To analyze the data collected through the questionnaires, descriptive and inferential statistical methods were used. After classifying and organizing information, the percentage of each option along with descriptive statistical items (mean, median, mode, and standard deviation) for each of the questions was calculated.

In inferential statistics part, one sample t-test, Pearson correlation, confirmatory factor analysis, path analysis, structural equation modeling, two sample T-test and analysis of variance were performed. Using one sample T-test, we aimed to study whether the variables are in a good condition Pearson correlation test examined the correlation between the variables examined. Correlation coefficient for all variables of the test should be more than 0.50 and significance level was near zero. In order to assess each variable by relevant statement, confirmatory factor analysis was used. T statistic was used to determine the significance of the model coefficients. In path analysis, the output diagrams showed the significance level of the coefficients and parameters of the test. The significance level should be larger than 1/96 or -1/96 smaller.

Results

The descriptive statistics showed that the participants' response to questions were considerably similar to each other and they deviate very slightly from the mean.

One sample T-test to was used to find out whether the variables are in a good condition Due to the use of the 5-point Likert scale, number 3 was chosen as a mid-range number. The significance level for all variables of the test was smaller than 0.05, so the null hypothesis was rejected. The result showed that the average of these variables had a significant difference with number 3. This means that all variables were in good condition to test.

Before the model of structural equations was tested, the correlation between the variables was examined. Table 2 shows the significance level and correlation coefficient for each variable. Correlation coefficient for all variables of the test was more than 0.50 and the significance level was near zero. All correlations between the variables were significant and acceptable.

In order to assess each variable by relevant statement, confirmatory factor analysis was used. Table 3 shows the standard coefficient, explained variance and a significance level of each statement of research. The results show that all statements intended to test hypotheses, according to standard coefficient measures, had necessary correlation. Also, T-statistic was used to determine the significance of the model coefficients. Since the significance level for all statements was larger than 1/96, it can be said that all statements were effective.

Table 1. One Sample T-Test Result of 1-4 Hypotheses

Hypotheses	T Statistic	Degree of Freedom	P-value	=3	95% Confidence Interval For Mean Difference	
				Mean Difference	Upper Bound	Lower Bound
1	24.02	159	0.001	1.09	1.187	1.007
2	27.69	159	0.001	1.28	1.377	1.194
3	14.17	159	0.001	0.671	0.765	0.577
4	18.28	159	0.001	1.05	1.171	0.942

Table 2. Pearson Correlation Test Result

	Correlation Coefficient	Resistance to change	Lack of standard	Competitive	Culture
	Significant Level				
Resistance to change	Correlation Coefficient				
	Significant Level				
Lack of standard	Correlation Coefficient	0.757			
	Significant Level	0.000			
Competitive	Correlation Coefficient	0.780	0.671		
	Significant Level	0.000	0.000		
culture	Correlation Coefficient	0.709	0.636	0.776	
	Significant Level	0.000	0.000	0.000	

Table 3. Confirmatory Factor Analysis Test Result

| Hypotheses	Mean	SD	Standard Coefficient	Explained Variance	T Value
1	4.33	0.78	028	0.47	3.94
2	3.82	0.81	0.43	0.42	-7.36
3	4.05	0.89	0.60	0.49	5.80
4	4.22	0.72	0.32	0.52	4.63

Also, the values of the fitting parameters in Table 4 show that the model goodness of fit was in a great position and all parameters were fitted to a high explanatory power.
In this section, we reviewed and tested the proposed hypotheses through path analysis.

The output diagrams show the significance level of the coefficients and parameters of the test. The significance level should be larger than 1/96 or -1/96 smaller. The results and significance level of path analysis are shown in Figure 1.

Table 4. Goodness of Fit Test Result of Confirmatory Factor Analysis

Goodness of Fit Index	Siginificance Level	Model Statistic
(Chi square) X^2	$X^2/df \leq 3$	1.7
RMSEA	RMSEA<0.08	0.080
NFI	NFI>0.90	0.90
CFI	CFI>0.90	0.91
GFI	GFI>0.90	0.90
AGFI	AGFI>0.85	0.86
IFI	IFI>0.9	0.91

Figure 1. Diagram of the significant coefficients

Chi-Square=0.00, df=0, P-value=1.00000, RMSEA=0.000
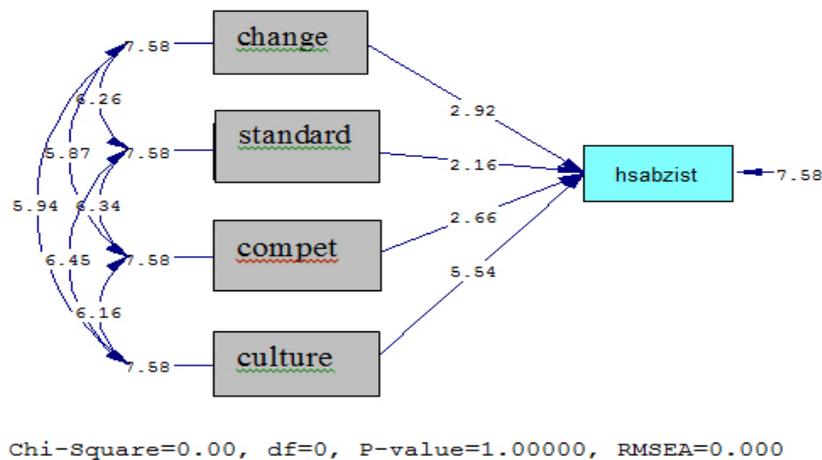
The results showed that among the investigated factors, the culture of society in dealing with environmental issues with a significant Coefficient of 5.54 had the greatest impact among the factors influencing the use of environmental management accounting tools. After that, resistance to change, competitive environment, difficulty of collecting and allocating environmental costs, and lack of standards had the greatest impact.

To test the conceptual model and hypotheses, structural equation model was used. According to Figure 2, all the t-statistic values were greater than 1.96, so it is concluded that all the routes specified in the model were significant. In other words, the four factors under investigation affect the use of environmental management accounting tools in oil refining and petrochemical companies.

Goodness of fit test results also show that, in this study, structural equation model was in a great position.

To test the fifth hypothsis, two sample T-test and variance analysis were used. Table 5 shows a summary of the result of the test. Gender had no effect on financial managers' view as far as the research hypotheses were concerned. Age, however, was effective as far as hypotheses 2, 3 and 4 were concerned. Education level, except for the first hypothsis, did not seem to have a significant effect on financial managers' views. Professional work experience for all hypotheses affected the managers' views. Field of study, except for the fourth hypothesis, affected the financial managers' views.

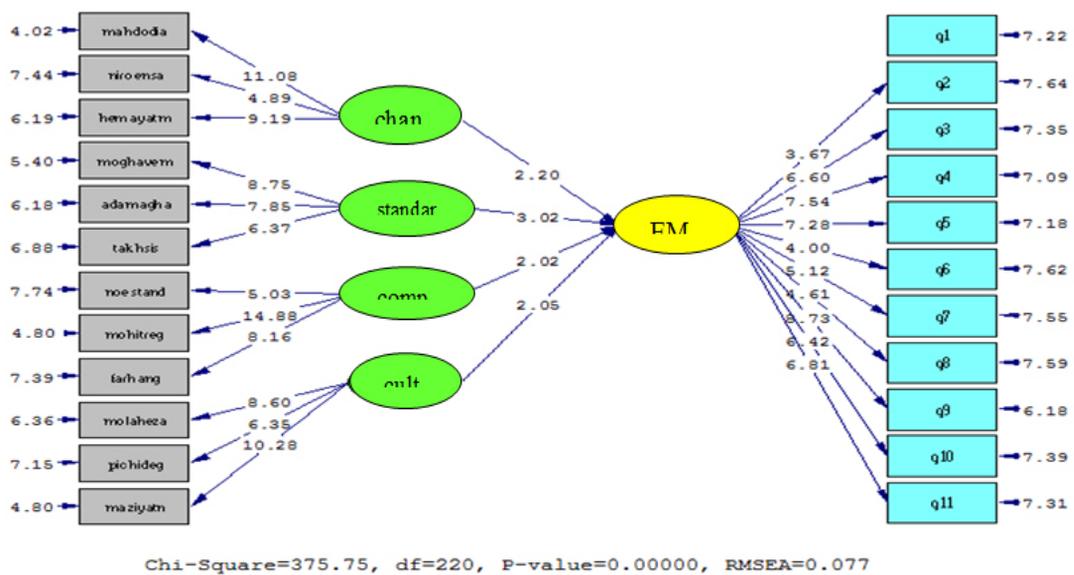**Figure 2.** Diagram of significant numbers of conceptual model

Chi-Square=375.75, df=220, P-value=0.00000, RMSEA=0.077

Table 5. Result of Fifth Hypothesis

	Hypotheses	1	2	3	4
Gender	T statistics	0.608	0.489	1.89	0.514
	Significant Level	0.544	0.626	0.059	0.608
	Result	H0 not Rejected	H0 not Rejected	H0 not Rejected	H0 not Rejected
Age	F statistics	1.94	3.23	4.61	3.32
	Significant Level	0.123	0.023	0.004	0.020
	Result	H0 not Rejected	H0 Rejected	H0 Rejected	H0 Rejected
Education level	F statistics	5.9	0.92	2.07	1.81
	Significant Level	0.003	0.39	0.13	0.16
	Result	H0 Rejected	H0 not Rejected	H0 not Rejected	H0 not Rejected
Professional Work Experience	F statistics	9.2	5.56	4.24	6.2
	Result	0.000	0.000	0.000	0.000
	Result	H0 Rejected	H0 Rejected	H0 Rejected	H0 Rejected
Field of Study	F statistics	10.75	6.41	1.99	6.16
	Significant Level	0.000	0.000	0.116	0.000
	Result	H0 Rejected	H0 Rejected	H0 not Rejected	H0 Rejected

Discussion

The observed result indicated that financial managers in petrochemical and oil refining company believed that resistance to change, difficulty of collecting, allocation of environmental costs and lack of standards, competitive environment, and culture of the society in dealing with environmental issues affect the use of environmental management accounting tools. Path analysis and structural equation modeling analysis showed that among the effective factors, culture of the society had the highest effect with 5.54 significance level.

An analysis of personal variables revealed that, with 95% confidence level, gender was not a significantly effective factor. Age was found to be effective, creating a significant difference. This might be due to increasing experience in professional work, as a result of ageing. Education level, almost, did not have any special effect on other hypotheses. Professional work experience had an effect. Field of study, too, except for the fourth hypothesis, had an effect on other hypotheses.

Conclusion

According to the results of the study, it is recommended that, by using personality tools, the right people should be appointed in organizational positions in the agency to implement environmental management accounting. Naturally, people who are risk takers, accept the changes in the procedure more rapidly. Accounting experts and professionals are strongly required to compile effective and efficient standardsIt is necessary and appropriate for the firms to have uniform guidelines to inform the users about their environmental performance.

It is necessary to establish the use the tools in reducing environmental pollution; the environment should be considered as one of the people's domestic assets and they should protect the environment as a moral and ethical duty.It is recommended that future researchers should identify different patterns of innovation and develop other factors. Moreover, the role of individual variables, environmental variables, and log position with regard to the vital impact of these independent variables in this model, should be examined in order to improve or offer new models to examine the patterns.

Conflict of Interest

None declared.

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