



## **Analysis of Factors Affecting the Adoption and Use of Environmental Management Accounting to Provide a Conceptual Model**

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### **ABSTRACT**

The present study examines and modeling the factors influencing the use of environmental management accounting tools from the financial managers and assistants point of view, who are in the oil refining and petrochemical companies. For this purpose, five main hypotheses have been developed and tested by using questionnaire. The result of this test by using, confirmatory factor analysis and structural equation test showed that from financial managers and assistants' point of view, resistance to change, lack of standards and methods for gathering and allocation of environmental costs and lack of standards, competitive environment and society culture in dealing with environmental issues are the factors that influence the use of environmental management accounting tools. The result of the fifth hypothesis test showed that except sex, all of the personal characteristic of managers and assistants like professional work experience, field of study, academic paper and age have meaningful influence on the financial managers and assistants' point of view in the ratio of some effective factors in using the environmental management accounting tools.

**Keywords:** Environmental Management Accounting, Oil Refining Company, Path Analysis

**JEL Classifications:** C32, O13, O47

### **1. INTRODUCTION**

The business environment is continuously changing. Ahadiat (2008) propose that this growth is because of globalization, increasing information technology, new rules on corporate governance and other democrats. These changes have had a significant impact on the role of management accounting (Bahramfar et al., 2007). What should we care about is that the new situation requires new methods in accordance with the inevitable changes and developments. Therefore, any system of management accounting is expected that adapt to their new situation and, if possible, goes beyond the current situation (Albright and Lam, 2006).

One of the issues raised recently in the field of management accounting has been discussing environmental management accounting. In the past, not seems to be entered the environment in economic discussions. Press organizations in order to force

them to minimize environmental damages and costs was evident. Now, the situation has changed. Environmental performance of the organization draw the special attention to internal and external stakeholders and a major challenge and concern brought to accounting. Social concerns about the environment, organizations are forced by the fact that they have no inherent right to the environment and shall be responsible for the environmental consequences and be held responsible (Alamshah, 2011). This study sought to identify and modeling 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.

### **2. THEORETICAL BACKGROUND**

The following we examined the internal and external factors influencing the use of environmental management accounting tools. Resistance to change and difficulty of gathering and

allocation of environmental costs and the lack of clear standards as an internal factors and competitive environmental and culture as an external factors studied and tested.

## 2.1. Internal Factors

### 2.1.1. Resistance to change

Changes in organizations means that the organization's activities different from the present situation to a new situation. For changes to be implemented in the organization there are obstacles that hinder its implementation. Resistance to change can be defined as follows: The person or group that attempts to stop or disrupt the changes to things. While the environment is constantly changing and coordination with these changes is mandatory for organizations (Moghimi, 1997).

From the perspective of Stark, reasons for employee resistance to organizational change are: Fear of failure, habits, lack of obvious need, losing control, fear of a support system, closed mind, a lack of willingness to learn, fear the new method may not be better, and fear of the effects of individual characteristic (Salavati et al., 2013).

### 2.1.2. The difficulty of gathering and allocation of environmental costs and the lack of clear standards

Disclosure of information related to environmental costs, increase reliability and social status of firms and it can be an effective tool to achieve competitive advantage. But in systems such as the traditional accounting, measurement and reporting of environmental costs are not included, therefore the efficiency of these systems are not required for registration and disclosure of such costs and changing these systems facing with limitations Including restrictions in the absence of a clearly standards for measuring and reporting environmental costs. For example, although some firms to disclose environmental costs in their annual financial reports, but it is not comprehensive of all firms do, so reports provided don't have required consistency and comparability (Janani and Heidari, 2011).

## 2.2. External Factors

### 2.2.1. Competitive environment

The world is changing and the speed of the change is increasingly tremblay. New technologies emerge and disrupts existing equations. Therefore, the financial systems should be able to adapt to this changes in the business. Therefore, information providers should be the providers of advanced information and high quality services at high price otherwise not have a place in the future. Sustainable development theory, the use of tools in order to prevent and control environmental pollution makes it inevitable. Today, financial firms have to balance the benefit of focusing on the profit on one hand and social and environmental issues on the other hand. The maintenance of firms are increasingly dependent on social responsibility, and this has caused businesses to report on their sustainability and environmental accounting (Rahnama et al., 2014).

### 2.2.2. Culture

Ebrahimi et al. (2015) argues that culture influences on decisions related to the use of means of reducing environmental pollution, especially in the accuracy and adequacy of the disclosure by firms

and managers. He compared the culture in developed countries and in developing countries to understand the difference between them and propose that, accounting systems in developed countries cannot be extended to the developing countries (Moghadaspoor and Ali, 2014).

Ramezani (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. If people treat the environment as one of their specified assets, protect it not only necessary but inevitable part of their lives. He said, environmental policies in response to environmental discussion are not done as long as people are demanding a better environment.

## 3. LITERATURE

Norsyahida et al. (2016) in their research entitled "the characteristics of the company and implement environmental management accounting" 5 features of each company include: Sensitivity to environmental issues industry, company size, ownership status, acceptance environmental management and the percent of outside directors and its impact on the implementation of environmental management accounting is studied. The results of questionnaires show that, the use of environmental management accounting adjustment than before and has increased in comparison with the past. In addition, more emphasis on environmental activities benefit and cost considerations. He found that with the exception of property ownership status, extent of implementation of environmental management accounting between different companies with different characteristics not much different.

Ebrahimi et al. (2015) in a study titled "environmental accounting and challenges must be faced in Iran" believe that the implementation of environmental accounting in the interests of all consumers and the environment, but Iranian organizations not willing for implementation of this important. More standards and procedures need to promote community life and community health.

Amiratashany et al. (2014) studies and prioritize management accounting techniques by using questionnaires in 13 company's subsidiary of National Iranian Oil Refining and Distribution Company. The results of this study showed that in the three main companies, the National Iranian Oil Company, National Iranian Gas Company and National Iranian Oil Refining and Distribution Company, cost management, value-added economic and cost management techniques were accounted for the highest score in this study.

Muza and Magadi (2014) in his research entitled "implementation of environmental management accounting in the mining sector in Zimbabwe" for gathering information using the questionnaire. They found that the adoption of environmental management accounting include implementation and statement increase sustainable development in companies and countries.

## 4. RESEARCH HYPOTHESES

Considering the research questions and theoretical foundations, we proposed and examined five hypotheses:

1. There is a relationship between the use of environmental management accounting tools and resistance to change.
2. There is a relationship between the use of environmental management accounting tools and the difficulty of collecting and allocating environmental costs and lack of standards.
3. There is a relationship between the use of environmental management accounting tools and competitive environment.
4. There is a relationship between the use of environmental management accounting tools and culture of the society in dealing with environmental issues.
5. There is a relationship between administrators and financial assistant's point of view about the factors influencing the use of environmental management accounting tools and their individual characteristics including gender, education level, field of study, Professional work experience and age.

### 5. RESEARCH METHOD

The method of this study is based on a descriptive survey and its design is 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 make sure of validity of questions, the researchers corrected the questions through several sessions based on expert's opinion. As a result, the questionnaire is a valid one. To evaluate the reliability of the questionnaire, Cronbach's alpha and split-half were used. Because the observed coefficients were above 70% for all of the cases, the measurement tools used in the study is reliable and none of the questions was removed.

The population consists of financial administrators and assistants in oil refining and petrochemical companies, a subsidiary of the national oil company. It is not the sampling method used and tested whole of the society include 182 people. Considering questionnaires that there was no possibility to return, 200 questionnaires were distributed among the population directly. Of the questionnaires distributed, 160 questionnaires (85% of sample) were gathered.

To analyze the data collected from questionnaires, descriptive and inferential statistical methods were used. After classify and organize information, the percentage of each option along with

descriptive statistic items (mean, median, mode, and standard deviation) for each of the questions were 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.

### 6. HYPOTHESES TESTING

Table 1, shows the descriptive statistics related to the research hypotheses. The standard deviation values reveal that participants' answer to questions are considerably similar to each other and deviating very slightly from the mean.

#### 6.1. One Sample t-test

In this section, using one sample t-test to study the issue that variables is whether in the suitable situation. Due to the adoption of the 5-point Likert-type, number 3 as a mid-range numbers are chosen. The significance level for all variables of the test is <0.05, so the null hypothesis is rejected. Resulting shows that the average of these variables have a significant difference with number 3. This means that all variables are in good condition to test (Table 2).

#### 6.2. Pearson Correlation Test

Before the model of structural equations are examined, the correlation between the variables examined. Table 3 shows significant level and correlation coefficient for each variable. Correlation coefficient for all variables of the test is more than 0.50 and significant level is near zero. All correlations between the variables is significant and acceptable.

#### 6.3. Confirmatory Factor Analysis

In order to assess explain each variable by relevant statement, confirmatory factor analysis are used. Table 4 shows the standard coefficient, explained variance and a t value of each statement of research. The results show that all statements intended to test hypotheses, according to standard coefficient measures, have necessary correlation. Also, t statistic is used to determine the significance of the model coefficients. Since the t value for all statements is larger than 1/96, it can be said that all statements is effective.

Also, the values of the fitting parameters in Table 5 show that the model goodness of fit is in a great position and all parameters are fitted to a high explanatory power.

#### 6.4. Path Analysis

In this section 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

**Table 1: Descriptive statistic of the hypotheses**

Hypotheses	Number	Mean±SD
1	160	3.64±0.889
2	160	3.32±0.845
3	160	3.22±1.05
4	160	3.93±0.878

SD: Standard deviation

**Table 2: One sample t-test result of 1-4 hypotheses**

Hypotheses	t statistic	Degree of freedom	Significance level	=3		
				Mean difference	95% confidence interval for mean difference	
					Upper bound	Lower bound
1	24.02	159	0.000	1.09	1.187	1.007
2	27.69	159	0.000	1.28	1.377	1.194
3	14.17	159	0.000	0.671	0.765	0.577
4	18.28	159	0.000	1.05	1.171	0.942

**Table 3: Pearson correlation test result**

	Resistance to change	Lack of standard	Competitive	Culture
Resistance to change				
Correlation coefficient				
Significant level				
Lack of standard	0.757			
Correlation coefficient	0.000			
Significant level				
Competitive	0.780	0.671		
Correlation coefficient	0.000	0.000		
Significant level				
Culture	0.709	0.636	0.776	
Correlation coefficient	0.000	0.000	0.000	
Significant level				

**Table 4: Confirmatory factor analysis test result**

Hypotheses	Mean±SD	Standard coefficient	Explained variance	t value
1	4.33±0.78	0.28	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

SD: Standard deviation

**Table 5: Goodness of fit test result of confirmatory factor analysis**

Goodness of fit index	Significant level	Model statistic
Chi-square $\chi^2$	$\chi^2 / df \leq 3$	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

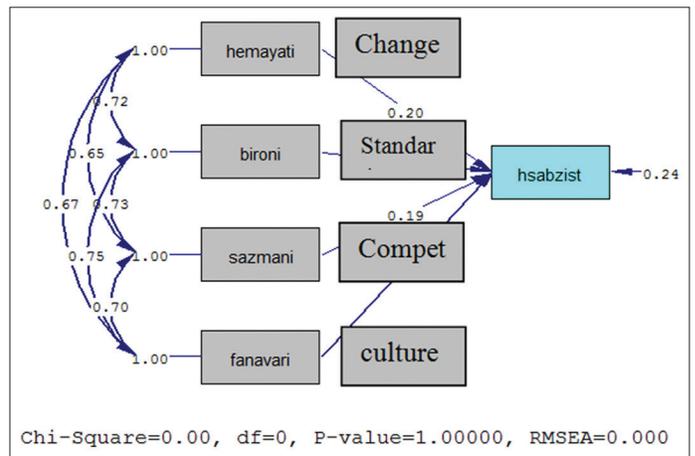
coefficient should be larger than 1/96 or -1/96 smaller. The results and significance coefficient of path analysis shows in Figures 1 and 2.

The result showed that among investigated factors, the culture of society in dealing with environmental issues with a significant coefficient of 5.54 have the greatest impact among the factors influencing the use of environmental management accounting tools. After that, resistance to change, competitive environmental and the difficulty of collecting and allocating environmental costs and lack of standards have the greatest impact.

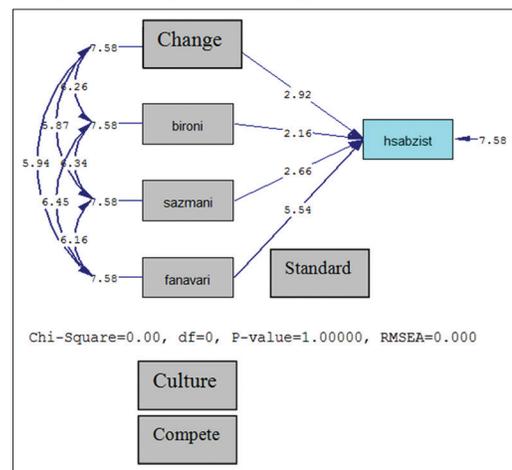
**6.5. Structural Equation Modeling Analysis**

To test the conceptual model and hypotheses, structural equation model was used. Figure 3 presented standardized coefficients that represent the impact of each factor in explaining the variance factors. According to Figure 4, all the t statistic values >1.96, the conclusion is made that all the routes specified in the model is significant. In other words, the four factors under investigation affect on using environmental management accounting tools in oil refining and petrochemical companies. Goodness of fit test

**Figure 1: Diagram based on the analysis of standardized coefficients**



**Figure 2: Diagram of the significant coefficients**



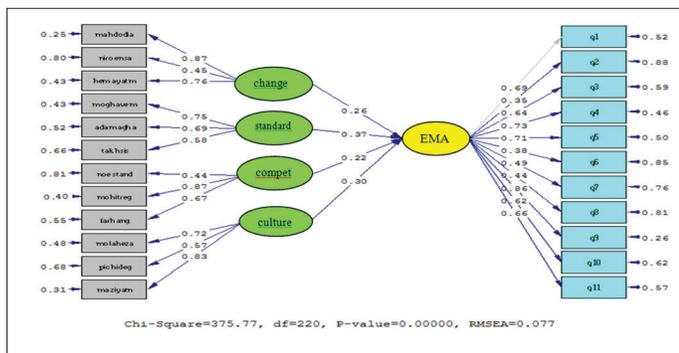
results also show that in this study, structural equation model is in a great position.

To test the fifth hypothesis, two sample t-test and variance analysis were used. Table 6, shows a summary of the result of the test. Gender seems to have no effect on financial managers view as far as the research hypotheses are concerned. Age, however, is effective as far as hypotheses 2, 3 and 4 are concerned. Education level, except for the first hypothesis, does not seem to have a significant effect on financial managers' view. Professional work

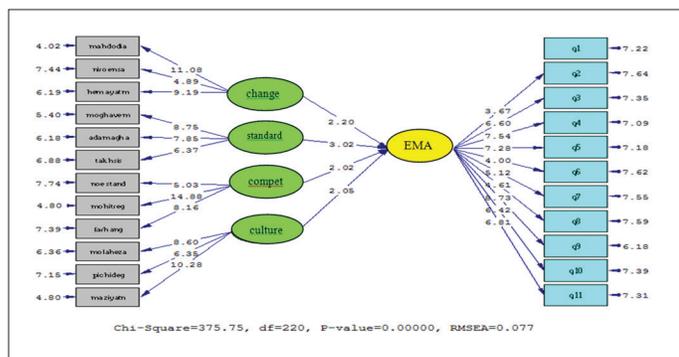
**Table 6: Result of fifth hypothesis**

Factor	Hypotheses	1	2	3	4
Gender	t statistics	0.608	0.489	0.514	1.89
	Significant level	0.544	0.626	0.608	0.059
	Result	H <sub>0</sub> not rejected			
Age	F statistics	1.94	3.23	3.32	4.61
	Significant level	0.123	0.023	0.02	0.004
	Result	H <sub>0</sub> not rejected	H <sub>0</sub> rejected	H <sub>0</sub> rejected	H <sub>0</sub> rejected
Education level	F statistics	5.9	0.92	1.81	2.07
	Significant level	0.003	0.39	0.16	0.13
	Result	H <sub>0</sub> rejected	H <sub>0</sub> not rejected	H <sub>0</sub> not rejected	H <sub>0</sub> not rejected
Professional work experience	F statistics	9.2	5.56	6.2	4.24
	Significant level	0	0	0	0
	Result	H <sub>0</sub> rejected	H <sub>0</sub> rejected	H <sub>0</sub> rejected	H <sub>0</sub> rejected
Field of study	F statistics	10.75	6.41	6.16	1.99
	Significant level	0	0	0	0.116
	Result	H0 rejected	H0 rejected	H0 rejected	H0 not rejected

**Figure 3:** The standard estimate is based on a conceptual model



**Figure 4:** Diagram of significant numbers of conceptual model



experience too, for all hypotheses can affect managers' view. Field of study, except for the fourth hypothesis, can affect financial managers view.

### 7. CONCLUSION

The result of hypotheses testing show that null-hypotheses are rejected and all of 1-4 hypotheses are accepted. That is, the observed result indicate that, financial managers in petrochemical and oil refining company believe that, resistance to change, difficulty of collecting and allocating of environmental costs and lack of standards, competitive environmental and culture society in dealing with environmental

issues affect the using of environmental management accounting tools. Path analysis and structural equation modeling analysis shows that among the effective factors, culture of society have the highest effect with 5.54 significant coefficient.

An analysis of personal variables reveals with 95% confidence level that gender was not a significantly effective factor as it did not affect 1-4 hypotheses. As for the second, third and fourth hypotheses are concerned, age was found to be an effective factor, creating a significant difference. This maybe because of increasing experience in professional work, as a result of ageing. Education level, except for the first hypothesis, did not have any special effect on other hypotheses. Professional work experience, had an effect on all hypotheses. Field of study too, except fourth hypothesis, had an effect on other hypotheses.

According to the results of the study recommends that, by using personality tools, the right people be appointed in organizational position that agency to implement environmental management accounting. Naturally, people who risk taker, faster accept changes in the procedure. The presence of Thinkers and professionals accountant for edit effective and efficient standards strongly felt. It is necessary and appropriate that firms having uniform guidelines to inform their environmental performance.

It is recommended to future researchers to identify different patterns of innovation adoption study and develop other factors. Moreover, the role of individual variables, environment variables, and log position with regard to the vital impact of these independent variables in this model, examined in order to improve or offer new models to examine patterns.

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