ASSESSMENT OF DIFUSION OF BEST ENVIRONMENTAL MANAGEMENT PRACTICES IN TANZANIA

Madaka TUMBO*[1] and Nyangi CHACHA[*2]

1 Institute of Resource Assessment, University of Dar es Salaam, P.O. Box 35097,Dar es Salaam, Tanzania

2 Colleges of Engineering and Technology, University of Dar es Salaam, Dar es Salaam, Tanzania

* Corresponding author, email: madaka.tumbo@ira.udsm.ac.tz

Abstract

This study evaluated the extent of diffusion of best management practices (BMP) in some chemical industries in Dar es Salaam. The data were collected from ten (10) different chemical industries through structured questionnaires and observations. The data were statistically analyzed using Statistical Package for Social Sciences (SPSS) version 11.5. The Chi-square (χ^2) test at the 5% level of significance was frequently used to test the homogeneity or the significance of respondents (general managers, production managers and laboratory technicians) against several environmental aspects (variables). The findings indicate that most of the industrial staff are not aware of best management practices and the level of awareness did not differ (P>0.05) among respondents. Lack of information regarding BMP, inadequacy of pollution management training and lack of corporate environmental policy (CEP) were considered to be the major factors which contribute to low level of awareness among industrial employees. The study found further that lack of expertise hindered the formulation of CEP, implementation of cleaner production technologies and certification to ISO 14001. In order to comply with pollution prevention and control strategies, the study proposes and recommends the adoption of a BMP procedural model. This model includes strategies, practices and efforts that are intended to reduce environmental pollution (environmental best management practices) resulting from chemical industrial activities.

1.0 INTRODUCTION

Environmental management can be defined as the management and control of the environment and natural resources systems in such a way as to ensure sustainable development (Biswas, 1987); and it involves preventing or abating the undesired effects of human activities or operations (Lemmens *et al*., 1998). BMP can be defined as all practices that are undertaken by an individual, company, organization or institution to reduce or control pollutants to both human and natural environment.Increasing use of new technologies for industrial production, produce new complex wastes and products beyond our ability to treat and control them or even detect their presence (Lund, 1971). Furthermore, industrial production should go hand in hand with the adoption of best techniques that minimize pollution. It is therefore imperative that the degree of adoption of best management practices is known and appropriate recommendations are given to respective industries.

Dar es Salaam has many industries compared to other regions and is perceived to have a lot of environmental problems. **"**About 80% of the industries in Tanzania, which includes agro-industries, chemical factories, breweries, soap and steel-manufacturing establishments, are located in the coastal city of Dar es Salaam. Out of the 57 industries surveyed in Dar es Salaam, about 68% contribute directly or indirectly to pollution of the Indian Ocean"[1].

Many industries adopting best management practice model are aiming at reducing the impact of pollution to the environment. Australian Cotton Industry Council (ACIC) for instance, implemented BMP as initiatives that encourage growers to take individual responsibility for environmental protection and try to improve their environmental performance over a period of time. The BMP model which was used by the cotton industry includes guidelines on-farm design and management, integrated pest management and the application of pesticides. This measure ensured that environmental standards were upheld and cotton was grown within a framework that was acceptable to the community. It is also a means by which the industry can successfully argue for continued self-regulation in a time of increasing regulatory pressure (ACIC, 1998).Although industrial pollution is not yet pronounced like it is in the developed countries, many researchers have been reporting an increased industrial pollution situation in Dar es Salaam. For instance, a study conducted by Dar es Salaam City

[1]http://www.unep.org/eaf/Docs/SAPEaf5/tanzania.htm

Council (DCC) in 2004 revealed that 3000 tones of waste were generated per day in the city; among these about 129 tones/day were generated from textile industries (such as Karibu Textile Mills-KTM, and Tanzania China Friendship Textile Co. Ltd.) and 63 tones/day were generated from metal industries (DCC, 2004).

Mato (2001) in his study on groundwater pollution in Dar es Salaam City, Tanzania which was carried out between 1997 and 2001, observed that more than 40% of the samples that were collected from the boreholes failed to comply with the national standard of drinking water in nitrate, faecal coliform and chloride contents. These findings led him to conclude that the major sources of groundwater pollution are domestic waste, industrial effluents and leachates from solid waste disposal sites.Some industries in Dar es Salaam have been found to be responsible for the pollution of the marine environment. The detection of high levels of heavy metals (Zinc, Copper, Lead, Chromium, Manganese, Iron, Nickel and Cadmium) in Msimbazi river is evidence of the effect of the environmental contamination emanating from industrial effluents in Dar es Salaam (Ak'habuhaya and Lodenius, 1988). Kironde in his report on the problem of the governance of waste in Dar es Salaam reported that about 94% of the industries in Dar es Salaam are connected to piped-water sewerage system and 6% to septic tanks as a means to handle their waste, and the mode of treating these waste are oxidation and stabilization ponds. But he indicated that these wastes are discharged into the stabilization ponds without pre-treatment. As a result the wastes tend to pollute rivers especially Msimbazi which was known for its clean water during the colonial times, but, currently the Msimbazi river is the recipient of industrial effluent (Kironde, 1996).

2.0 OBJECTIVES

The general objective of this study was assess the odiffusion of environmental best management practices in selected chemical industries in Dar es Salaam as a tool for preventing or reducing industrial pollution.

Specific objectives

- To determine the level of awareness of Chief Executive Officers (CEO)/ employees on Best Management Practices (BMP) and its components.
- To assess adoption level of environmental management systems ISO 14001.
- To examine development and implementation of environmental management policies by industries.

3.0 METHODOLOGY

The study was conducted in selected chemical industries in Dar es Salaam city. The city of Dar es Salaam has three municipalities namely: Temeke, Kinondoni and Ilala, and each municipality has a number of chemical industries from which few were selected and visited to collect relevant information for the study. The Dar es Salaam Region is located at 6°20' S to 7°30' S and 39°00' E to 39°30' E. It is situated on a coastal plain bordering the Indian Ocean along the major roads which leads out of town. These are Bagamoyo Road, Morogoro Road, Pugu Road and Kilwa Road.The targeted group for this study was composed of three categories. These were General Managers/Directors, Production Managers and Senior Laboratory Technicians from the chemical industries. It was assumed that from each industry there was only one (1) General Manager/Managing Director, Production Manager and Senior Laboratory Technician, thus from each industry three respondents, one from each category, were asked to provide information on the subject matter.

3.3. Data

Structured questionnaires containing both closed and open-ended questions were administered to the general managers or managing directors, production managers and laboratory technicians to obtain information regarding different aspects of the study. Interviews and discussions with the respondents facilitated the administration of the questionnaire.

3.4 Data Analysis

The information collected was f coded in order to allow easy analysis in the Statistical Package for Social Sciences (SPSS) and hence its presentation leading to valid inferences/conclusions with respect to the problem under investigation. After coding, the data were subjected for analysis into the SPSS. The Chi-square (χ^2) test at the 95% (α=0.05) confidence interval was frequently used to test the homogeneity or the significance of population variance of respondents (general managers, production managers and laboratory technicians) against several variables.

4.0 RESULTS AND DISCUSSION

4.1.1 Awareness on environmental Best Management Practices (BMP)

A total of 30 respondents (10 general managers / managing director, 10 production managers and 10 laboratory technicians) from 10 industries responded to questionnaire-guided interview and discussion. From Table 4.1, the results show that there was no significant difference (P>0.05) with regard to what environmental best management practices is all about across respondents. Only 53.33% of the respondents reported to be aware of environmental best management practices, while the remaining respondents reported not to be aware of BMP. Lack of information regarding BMP could be attributed to lack of corporate environmental policy and lack of industrial pollution management training within the industries. One major objective of corporate environmental policy is to provide strategy to conserve the environment. One of such strategy is to provide training on good management practices that may rescue the environment from industrial pollution. However, many of the chemical industries studied did not have corporate environmental policy . In general it can be argued that, most of our industries are mere profit conscious and less sensitive on matters that aim at reducing the impact of pollution to the environment.

Table 1: Awareness of environmental Best Management Practices

Variable	Categories	Percentage of respondents			Average % (n=30)	χ^2	*P*-value
		General Manager (n=10)	Production Manager (n=10)	Laboratory Technician (n=10)			
Aware of BMP	Yes	50.00	60.00	50.00	53.33	0.480	0.875
	No	50.00	40.00	50.00	46.67	(d.f=2)	
BMP include:							
Schedule of activities for production	Don't know	50.00	40.00	50.00	46.67	1.095	0.895
	Yes	20.00	20.00	30.00	23.33	(d.f=4)	
	No	30.00	40.00	20.00	30.00		
Prohibition of bad practices on the environment	Don't know	50.00	40.00	50.00	46.67	1.925	0.750
	Yes	40.00	30.00	40.00	36.67	(d.f=4)	
	No	10.00	30.00	10.00	16.67		
Maintenance procedure	Don't know	50.00	40.00	50.00	46.67	0.725	0.948
	Yes	30.00	40.00	40.00	36.67	(d.f=4)	
	No	20.00	20.00	10.00	16.67		
Structural and managerial practices	Don't know	50.00	40.00	50.00	46.67	1.095	0.895
	Yes	20.00	20.00	30.00	23.33	(d.f=4)	
	No	30.00	40.00	20.00	30.00		
General pollution prevention techniques	Don't know	50.00	40.00	50.00	46.67	0.429	0.980
	Yes	30.00	30.00	30.00	30.00	(d.f=4)	
	No	20.00	30.00	20.00	23.33		
Cleaner production techniques	Don't know	50.00	40.00	50.00	46.67	2.543	0.637
	Yes	40.00	60.00	50.00	50.00	(d.f=4)	
	No	10.00	0.00	0.00	3.33		

Source: Field survey, December 2006

4.2 Adoption of ISO 14001 –Environmental Management Systems

In accordance with the environmental management system that enables the industry to audit environmental problems, 100% of the respondents indicated that their industries had not adopted ISO 14001. No statistic was computed to this effect because 100% of the respondents gave the same response about the adoption of ISO 14001 in their industries. The failure of the chemical industries to adopt ISO 14000 was partly contributed to lack of awareness. As discussed above, many of the respondents (60.00%) from the studied industries were not

aware of ISO 14001. In addition, among the industries which were aware of BMP the following were the reasons for not adopting ISO 14001: Lack of experts: Expertises are needed to train human resources in the industries in order to fulfil the standard requirements. A change in operational and structure of the industries to allow easy adoption of ISO 14001 need involvement of expertise or experienced personnel who are not enough in the country. Lack of funds: Due to lack of experts within the country, employing expertise from outside the country to implement EMS in the industries requires a lot of money. These reasons are also supported by Pfliegner (1996) who mentioned lack of resources, such as information, capital, technology, skilled human resource, training facilities, qualified consultants and auditors as a barrier to implement an ISO 14007 (EMS) for companies in the developing countries.

4.3 Development and Implementation of EMP by the Industries

4.3.1 National Environmental Policy (NEP)

Although Tanzania has a national environmental policy, overall, 46.67% of the respondents (50% general managers, 60% production managers and 30% laboratory technicians) indicated to be unaware of what the national environmental policy is all about (Table 2). The results showed no significant difference (P>0.05) between respondents. The Government of Tanzania has taken important steps to address environmental problems through various ways including introducing the environmental policy and the environmental law. However, these efforts are yet to be successful. This is contributed by weak implementation of the policy and enforcement of laws, and poor coordination between environmental agencies such NEMC on one side and the industries on the other side. Failure to observe environmental policies/laws has resulted into many problems such as rapid depletion of the natural resources and people's livelihoods, health hazards and intensification of poverty.

Table 2: Development and implementation of EMP by industries

Variable	Categories	Percentage of respondents			Average % (n=30)	χ^2	*P*-value
		General Manager (n=10)	Production Manager (n=10)	Laboratory Technician (n=10)			
Aware of NEP	Yes	50.00	40.00	70.00	53.33	1.875	0.392
	No	50.00	60.00	30.00	46.67	(d.f=2)	
Policy implemented by industry	Yes	10.00	10.00	30.00	16.67	1.920	0.383
	No	90.00	90.00	70.00	83.33	(d.f=2)	

Source: Field survey, December 2006

4.4.2 Implementation of environmental management policies by industries

Regarding the importance of environmental management policies in the industries, only 16.67% of the respondents reported that their industries had developed and implemented policies in order to manage the environment. No significant difference (P>0.05) was found between respondents with respect to the aspect of policy implementation (Table 2). Although the National Environmental Policy (URT, 1997) has many strategies (e.g cleaner production) that can be incorporated in various policies such as the corporate environmental policy most industries did not have any policy that incorporates such strategies. Moreover, the study found that approximately two (16.67%) industries had corporate environmental policy. Further discussion with some of the respondents revealed that they were not aware of what the corporate environmental policy was all about and also how to formulate it. However, respondents took this as a challenge.

5.0 CONLUSION

In the light of the above findings, it is concluded that lack of information regarding BMP, inadequacy of pollution management training and lack of corporate environmental policy, which may constitute strategies and plan for pollution management are among the major factors that contribute to poor awareness of BMP and its diffusion in Tanzanian industries. On the other hand, in addition to lack of information/knowledge regarding BMP and corporate environmental policy; several other constraints that may hinder the implementation of BMP in the studied industries have been highlighted. Some of the constraints included shortage of funds for the implementation of different cleaner technologies and the adoption of ISO 14001, and lack of expertise.

7.0 REFERENCES

Ak'habuhaya, J. and Lodenius, M. (1988). "Metal pollution of River Msimbazi, Tanzania", *United States Journal of Environmental International*, Vol/Issue 14/6.
p 511-514

Australian Cotton Industry Council, (1998). "Cotton industry annual report", Australia; Industrial Company printer. p 11

Biswas, A.K. and Geping, Q. (1987). *Environmental Impact Assessment for Developing Countries*, London; Tycooly Publishing Company. p 196

Dar es Salaam City Council, (2004). Dar es Salaam City Profile, United Republic of Tanzania.
Lemmens, A.M.C., Katima, J.H.Y. and VanHoren, D.J.M. (1998). *Environmental Management,* Draft Version. p 47

Lund, H.F. (ed), (1971). *Industrial Pollution Handbook*, NewYork; McGraw Hill Book Company. p 9-13

Mato, R. R. (2001). *Groundwater Pollution in Dar es Salaam City, Tanzania-Assessing Vulnerability and Protection Priorities*, http://www.Chem.true.nl/Set/Setfiles/People/mato%20%20research%20brief. doc., visited on 3/8/2006

Pfliegner, K. (1996). "Report on Environmental Management Standards and Implication for Exporters to Developed Market", New York; UNEP

United Republic of Tanzania, (1997). *Economic Aspect of Sustainable Development in The United Republic of Tanzania,* http://www.un.org/esa/agenda21/natlinfo/countr/tanzania/eco.html,visited on 3/3/2007