Factors Influencing Non-Compliance to Industrial Wastewater Regulatory Framework in Tanzania

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Abstract

Enforcement of industrial wastewater regulatory framework in Tanzania has been a challenge despite having a comprehensive Environmental Management Act, Cap 191. The quality of industrial wastewater effluents discharged to the environment is above the permissible limit value of industrial effluents. A study on underlying motivations that encourage or discourage compliance with and enforcement of this Act to regulate industrial wastewater discharges has been conducted. An analysis was made using "The Table of Eleven software whith conceptual scheme that evaluates effectiveness of enforcement activities that generates compliance profile and maps the strong and weak points of the legislation, compliance level and enforcement practices according to the dimensions. Industries in Dar es Salaam and Mwanza cities which discharge effluents in water bodies were used as case studies. The study showed that informal reporting of violators by public, inspections, detection of violators and imposition of sanctions encourages compliance with and enforcement of the Act. Factors that discourage compliance and enforcement include unclear procedures to follow and high costs incurred to comply, poor understanding of the Act and sanctions not being administered proportionate to the severity of non-compliance. The study concluded that awareness raising, compliance monitoring and inspections, application of sanctions according to severity of violations are important for effective enforcement.

Key words: Enforcement, behavioural change, industrial wastewater legislation, Table of Eleven, Tanzania.

Introduction

Industrial wastewaters are in most cases more heterogeneous and may contain a wide range of contaminants with potential to cause harm both to human health and the ecosystem components (UNEP/WHO/HABITAT/WCCSS, 2004; Government of Canada, 2007; Corcoran *et al.*, 2010). Discharge of untreated industrial wastewater into the environment pollutes the environment, particularly water sources, within and beyond national borders (UNEP/UN-HABITAT, 2010; Corcoran *et al.*, 2010). As a result, it is estimated that more than 10 per cent of the world's population is consuming food that is irrigated with untreated wastewater of varying quality (World Health Organization, 2006; Scott *et al.*, 2007; UNEP/UN-HABITAT, 2010). This poses a real threat to the ecology of the ecosystems as well as to the resource users.

The industrial wastewater regulatory framework is a set of industrial wastewater legislation and enforcement systems to regulate industrial wastewater discharges for the purpose of protecting the human health and the environment (New Zealand Ministry of Environment 2003; Spellman, 2008; Corcoran *et al.,* 2010). Effective enforcement of industrial wastewater discharges ensures deterrence and compliance with permissible limit values for industrial effluents (Matos *et al.*, 2003; Braithwaite, 2003). As such regulatory frameworks are put in place to protect human health and the environment. However, in developing countries like Tanzania, despite existence of regulatory enforcement mechanisms that are stipulated in the industrial wastewater legislation, non-compliance behaviour renders them ineffective. While technological approaches have been initiated and enforcement measures are taken to ensure that the qualities of industrial discharges are within the permissible limits of industrial effluents, qualities of industrial wastewater discharged to the environment are often above the permissible limits of industrial effluents (Matos *et al.*, 2003; State of Environment, 2007;

NEMC, 2008). In Tanzania, various studies have shown that qualities of industrial wastewater discharged to the environment are above the permissible limit values of industrial effluents as prescribed in the Environmental Management (Water Quality Standards) Regulations of 2007. Table 1 below illustrates the qualities.

Table 1: Qualities of Industrial Effluents in Dar es Salaam, Mwanza and Morogoro

Study	Parameter								
	COD (mg/l)	BOD_5 (mg/l)	PH	Mercury (mg/l)	Chromium (mg/l)	Total-N (mg/l)	Total-P (mg/l)	TSS (mg/l)	
NEMC (2007)	200 to 1380	112 to 850	-	-	-	-	-	-	Industrial wastewater discharges from industries in Mikocheni industrial area into Mlalakuwa River in Kinondoni Municipality within Dar es Salaam City
Ministry of Water (2011)	492 to 3885	232 to 1080	8.6 to 11.4	0.01	4	-	-	-	Industrial wastewater discharged from industries in Kihonda industrial area discharged into Ngerengere River in, Morogoro municipality
NEMC (2008)	-	35 to 670	-	-	-	3 to 61	0 to 23	16 to 1087	Qualities of industrial effluents from industries in Mwanza City discharged industrial wastewater to Nyashishi catchment

									which ultimately discharges its water into Lake Victoria
Permissible Limit Values	**60**	**30**	**6.5 to 8.5**	**0.005**	**0.1**	**15**	**6**	**100**	

The above qualities which are above than the permissible limit values confirm non-compliance behaviour. Non-compliance behaviour illustrates inappropriate enforcement of industrial wastewater regulatory framework. This phenomenon necessitated to carry out the analysis of the motivation underlying compliance behaviour and effective enforcement of the industrial wastewater regulatory framework in the country. Therefore, the study aimed at examining motives that encourage or discourage compliance and enforcement of industrial wastewater legislation.

Methodology

In determining factors that encourage or discourage compliance and enforcement of the industrial wastewater legislation EMA Cap 191 was used as the basic legal instrument.

The study was carried through interviews, one-to-one discussion and focused group discussions. The stakeholders consulted included:

i. Policy makers: Vice President's Office (VPO) – Division of Environment (DOE), and Ministry of Industry and Trade (MIT).
ii. Enforcement Authorities: The National Environment Management Council (NEMC), Wami – Ruvu Basin Water Office (WRBWO), Lake Victoria Basin Water Office (LVBWO), Mwanza City Council (MCC), Dar es Salaam City Council (DCC) and Judiciary.
iii. Regulated community were presented by industries in Mwanza City (MZA INDs) and Dar es Salaam City (DSM INDs) that generate wastewater and discharge their industrial wastewater into water bodies.

Data on the behavioural motivations which aimed at gathering the opinions of enforcers and the regulatees' behaviour were collected and analysed using the EMA Cap 191 and the ''Table of Eleven'' software (Dutch Ministry of Justice, 2006). The "Table of Eleven" software is a conceptual scheme that evaluates effectiveness of enforcement activities (Elffers *et al.*, 2003). The software generates compliance profile which maps the strong and weak points of the legislation, compliance level and enforcement practices according to the dimensions. The questionnaire for data collection which adopted a checklist from ''Table of Eleven Model'' is shown in Table 2.

Table 2: Table of Eleven" Dimensions

Dimensions	Assumptions
Compliance Dimensions: Factors that affect the incidence of voluntary compliance	
Knowledge and clarity of legislation	If legislation is written in clear and understandable language, regulated community will likely comply with a regulation.
Cost-benefit considerations	If materials, time, money and effort advantages of compliance are higher than those of violation, and materials, time, money and effort disadvantages of compliance are less, then a regulated community will likely comply with a regulation.
Level of acceptance	If a regulated community generally accepts policy, laws, and regulations, to which it should comply, it will likely be in compliance.
Respect for authority	If a regulated community respects official authority to setup and enforce regulation, it will likely be in compliance.
Social control	If public or community try to correct non-compliance behaviour.
Enforcement Dimension: The influence of enforcement on compliance	

Risk of reporting	If there is a possibility that an offence may come to light other than during an official investigation and may be officially reported, a regulated community will likely be in compliance.
Risk of inspection	If there is a high likelihood of being subject to an administrative or substantive inspection by enforcement authorities, a regulated community will likely be in compliance.
Risk of detection	If there is a high probability of an official detecting an offence during inspection a regulated community will likely be incompliance.
Selectivity	If there is an increased chance of control and detection as a result of risk analysis and targeting of firms, persons or areas, a regulated community will likely be in compliance.
Risk of sanction	If there is a high likelihood of a sanction being imposed if an offence has been detected through inspections, a regulated community will likely be in compliance
Severity of sanction	If a sanction and adverse effects associated with imposing sanctions are adequate to cause damage and timely imposed, a regulated community will likely be in compliance.

The target group was industries that discharge effluents to water bodies in study areas and EMA Cap 191 which is a comprehensive law for industrial wastewater in Tanzania was analysed. The questionnaires used were first pilot tested before full deployment

Results

The motivations underlying effectiveness on enforcement of EMA Cap 191 in regulating industrial wastewater discharges as perceived by different respondents are depicted in Table 3.

Table 3: Behavioural Motivations (Lugwisha, 2016)

Respondents	Behavioural Motivations	
	Encouraging factors for compliance and enforcement	**Discouraging factors against compliance and enforcement**
Judiciary	▪ Extent to which the public disapproves the violating behaviour. ▪ Extent to which the public feels responsible and takes action (social sanction). ▪ Risks of being inspected and detecting violations. ▪ Sanctions to be imposed	▪ Lack of clarity of legislation for which regulated community unable to translate the legal language and makes them difficult to understand.
Division of Environment	▪ The public reacting with violations and taking actions such as reporting violations to higher authorities as it has been the case. ▪ Frequent inspections and detection of violations. ▪ Detection of an offence and sanction is imposed ▪ Severity of sanctions.	▪ Economic disadvantages in terms of time taken to comply and cost incurred in abiding to the environmental requirements such as specific conditions stipulated in the EIA / IEA. ▪ Adoption of clean technology.
Ministry of Industries	▪ Regulated community to respect the Government (e.g. paying taxes). ▪ Enforcement authorities detecting violations during inspections. ▪ Applying risk of sanctions upon detected violations.	▪ Increased costs and time in due cause of comply with environmental requirements and enforcement.
NEMC	▪ Economic advantages arising from compliance by maintaining good reputation, use of environmentally friendly products as well as reuse / recycling of by- waste and adoption of clean technologies. ▪ Having forums with regulated community to discuss environmental concerns. ▪ Public to detect violations and report to the higher authorities.	▪ Lack of clarity and unfamiliarity to the law to both regulators and regulated community. ▪ Poor participation of regulated community in decision making. ▪ Lack of capacity for inspectors to effectively conduct inspections and detect violations.

	▪ Increased number of inspections to violators to detect violation. ▪ Impose severe sanctions.	
Dar es Salaam City Council	▪ Good image and reputation of the regulated community. ▪ Detection of violations by the public and report to the higher authorities. ▪ Increased number of inspections to detect violations. ▪ Impose of sanctions to the detected violations	▪ Inadequate clarity and understanding of legal language to both regulators and the regulated community. ▪ Poor participation and involvement of regulated community in planning and decision making.
Mwanza City Council	▪ Benefits realised by compliance outweigh costs incurred for violations. ▪ Good reputation. ▪ Increased inspections and sanctions imposed for detected violations.	▪ Increased economic disadvantages for time take is too long and high in abiding to environmental requirements such as EIA / IEA. ▪ Increased cost in adopting clean technology. ▪ Poor participation of regulated community in environmental concerns.
Lake Victoria Basin Water Office	▪ Good image. ▪ Detected reported and violations by public. ▪ Increased number of inspections to detect violations.	▪ Time spent and costs incurred increased to abide to environmental requirement such as EIA / IEA process and adoption of clean technology is too expensive and cause economic disadvantages. ▪ Non-involvement of regulated community in dealing with environmental concerns. ▪ Regulated community inadequately respecting the Government by abiding to the set legal requirements.
Wami-Ruvu Basin Water Office	▪ Good image and reputation. ▪ Increased inspections to detect violations. ▪ Imposing severe sanctions to the detected violations.	▪ Poor understanding of the environmental requirements. ▪ Increased costs and time when trying to comply with environmental requirements.

		▪ Poor participation of regulated community in discussing environmental concerns. ▪ Poor record keeping within regulated community as well as regulators which has significant value in tracking issues of interest.
Dar es Salaam industries	▪ Good reputation; public detecting violations and report the same to the competent authorities. ▪ Inspectors conducting inspections ▪ Detect violations. ▪ Imposing severe sanctions to the detected violations.	▪ Costs incurred for maintenance or adopting clean technologies. ▪ Inadequate participation of regulated community in discussing environmental concerns.
Mwanza industries	▪ Good image. ▪ Increased inspections to detect violations ▪ Detection of offence. ▪ Impose sanctions to the detected violations.	▪ Poor clarity and understanding to the environmental requirements. ▪ Increased costs and time when trying to comply with environmental requirements. ▪ Inadequate involvement of regulated community in dealing with environmental issues.

With reference to Table 2. Table 4 clusters motivation for compliance and enforcement as perceived by different actors as shown in Table 3.

Table 4: Motivations for Compliance and Enforcement (Lugwisha, 2016)

Dimensions	Actors									
	Judiciary	DOE	MIT	NEMC	DCC	MCC	LVB WO	WR BW O	DSM INDs	MZA INDs s
Knowledge and clarity of legislation: If legislation is written in clear and understandable language, regulated community will likely comply with a regulation	-	0	0	-	-	0	0	0	0	-
Cost-benefit: If materials, time, money and effort advantages of compliance are higher than those of violation, and materials, time, money and effort disadvantages of compliance are less, then a regulated community will likely comply with a regulation	-	-	-	+	0	-	-	-	-	-
Level of acceptance: If regulated community generally accepts policy, laws, and	0	0	0	-	-	-	+	+	0	0

regulations, it will likely be in compliance										
Respect for authority: If regulated community respects enforcement authorities, it will likely be in compliance	0	0	+	0	0	0	-	+	0	+
Social control: If public try to correct non-compliance behaviour	+	+	0	+	+	+	0	0	0	0
Risk of reporting: If an offence may come to light other than during investigation and officially reported, a regulated community will likely be in compliance	+	+	0	+	0	0	0	0	0	0
Risk of inspection: If there is a high likelihood of being subject to an administrative or substantive inspection by enforcement authorities, a regulated community will	+	+	0	0	+	+	+	+	+	+

likely be in compliance.										
Risk of detection If there is a high probability of detecting an offence during inspection a regulated community will likely be incompliance..	+	+	+	0	+	0	+	+	+	+
Selectivity: If there is an increased chance of control and detection based on risk analysis and targeting of firms areas, a regulated community will likely be in compliance.	+	0	0	+	0	+	0	0	0	0
Risk of sanction: If there is a high likelihood of a sanction being imposed if an offence has been detected through inspections, a regulated community will likely be in compliance.	+	+	+	0	+	+	0	+	+	+
Severity of sanction: If a sanction and adverse effects	0	0	0	0	0	0	+	0	+	0

associated with imposing sanctions are adequate to cause damage and timely imposed, a regulated community will likely be in compliance.										

"+": a dimension has score showing that it encourages compliance and enforcement; **"-"**: a dimension has score showing that discourages compliance and enforcement; **"0":** no influence or dimension slightly encourages compliance and enforcement

Discussions

The results presented in Tables 3 and 4 demonstrate that perceptions on motives that encourage or discourage compliance and enforcement vary from one respondent to another respondent.

- Judiciary, NEMC, DCC and MWZ industries think that the Act is not well known to regulated community while the same dimension has no influence or slightly encourages compliance and enforcement as perceived by DOE, MOI, MCC, LVBWO, WRBWO and DSM industries.
- All respondents except NEMC and DCC consider that it is expensive to abide to the Act in terms of time taken, procedures to follow and costs incurred. This encourages non-compliance.
- NEMC, DCC and MCC believe that industries do accept the Act while LVBWO and WRBWO think the other way.
- Enforcement authorities are respected according to MIT, WRBWO and MZA INDs while LVBWO think the other way. The remaining respondents consider the same dimension has no influence.
- Reaction from the public to violators has great influence to encourage compliance and enforcement of the Act as perceived

by Judiciary, DOE, NEMC, DCC and MCC. While the rest respondents think that public has no or slight influence.

- All respondents acknowledge that inspections, detection of violators and imposition of sanctions encourage compliance with and enforcement of the Act.
- Sanctions served are not according to the severity of non-compliance. This encourages non-compliance.

Therefore, economic disadvantages have prevailed over moral or normative reasons when the regulated community decides whether to comply or violate a rule. In addition, imposition of sanctions not in relation to severity of non-compliance adversely affects compliance and enforcement of the Act. However, informal reporting of violators by public, inspections, detection of violations and imposition of sanctions encourages compliance and enforcement. In addition, competence also excels regulatory enforcement. Inappropriate enforcement strategies have critical detrimental effects, which give non-compliant behaviour with industrial wastewater legal requirements (Ministry of Environment and Forest, 1992; Eckenfelder, 2000; UNEP/GEF WIO-LaB, 2009). Enforcement mechanisms matter in designing and appraising any regulatory regime. Important aspects of any environmental management regime rely on a suite of legal obligations that are sustainably enforceable and enforced. They include: - education and assistance, compliance promotion, compliance monitoring and inspections, incentives and enforcement sanctions (Farmers, 2007). If they are not well effected, policy instruments such as permissible limits of industrial effluents are compromised (INECE, 2009; OECD, 2009).

Effective enforcement enhances deterrence and behavioural change of a regulated community (Firestone, 2002; Farmers, 2007; INECE, 2009). Shimshack and Ward (2008) found that inspections and sanctions are associated with improved future compliance and environmental performance. Empirical evidence also indicates that credible enforcement may increase beyond-compliance behaviour. Shimshack and Ward (2008) show that many industries with

discharges below legally permitted levels, reduce discharges further when regulators issues commensurate fines, even when issued on other industries. Also, non-compliant industries often respond to sanctions by reducing discharges beyond reductions required by law.

Enforcement deters detected violators or potential violators from breaking the rules again, and it deters other potential violators who may experience the same adverse consequences for non-compliance (Nyborg and Telle, 2006; Ostrovskaya and Leentvaar, 2011). How enforcement actions are implemented is important as they have significant effects to bring violators into compliance (Cohen, 2003; Shimshack, 2005; Shimshack, 2007; Gray and Shimshack, 2011).

INECE (2009) demonstrates that compliance behaviour can be optimised proactively with response options (enforcement actions) that are: flexible proportional to the risk posed by the breach/compliance behaviour, recognize the capacity and motivational of non-compliance to comply, and indicate seriousness of the enforcement authority. Others are transparent, consistent, and proportionate to the risk presented by the behaviour of regulated community, and based on the responsive measures (i.e. risk based) as well as combination of incentives and sanctions. For effective enforcement and compliance with EMA Cap 191, compliance monitoring and inspections, employing appropriate sanctions to the detected non-compliance and serving of sanctions according to severity of non-compliance are recommended.

Conclusion

The study showed that informal reporting of violators by public, inspections, detection of violators and imposition of sanctions encourages compliance with and enforcement of the Act. Factors that discourages compliance and enforcement include unclear procedures to follow and high costs incurred to comply, poor understanding of the Act and sanctions not being administered proportionate to the

severity of non-compliance. The study concluded that awareness raising, compliance monitoring and inspections, application of sanctions according to severity of violations are important for effective enforcement.

The used of Table of Eleven tool assisted to understand the underlying motivations of the regulated community to shape behaviour. A better understanding of underlying motivations that shape behaviour of a regulated community enables enforcement authorities to pay attention on tools and strategies to achieve compliance, allocate more efficiently resources, invest in activities that achieve results, and device appropriate interventions.

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