

Cost as a Determinant of Compliance with Environmental Regulations by Micro and Small Enterprises in the Manufacturing Sector in Nairobi, Kenya

Jane Gacoga Mpuhia

Kenya Polytechnic University College
Department of Earth, Environmental Science and Technology
P.O. Box 67693-00200
Nairobi, Kenya

Elegwa Mukulu

Jomo Kenyatta University of Agriculture and Technology
School of Human Resource Development
P.O Box 62000-00200
Nairobi, Kenya

Joseph Keriko

Jomo Kenyatta University of Agriculture and Technology
Nairobi Centre Campus
P.O Box 62000-00200
Nairobi, Kenya

Abstract

This research paper examines cost as a determinant of compliance with environmental regulations by micro and small enterprises (MSEs) in the manufacturing sector in Nairobi City, Kenya. All actors whose activities could impact on the environment including manufacturing MSEs are by law required to comply with ERs for safe and sustainable utilization of natural resources. The paper is based on a survey research that adopted a mixed research design. The target population was 358 manufacturing MSEs from which a sample of 10% (36 MSEs) was selected by stratified random sampling. Data was collected by administration of questionnaires to the MSEs supplemented by interviews and observation schedule. The study established that cost influenced compliance with ERs by the MSEs. The study recommended adoption of negotiated compliance to reduce prohibitive cost of ERs compliance and interventions to build capacity of MSEs to internally undertake environmental audits and thereby reduce on compliance costs.

Key Words: Manufacturing MSEs Nairobi; MSEs Compliance with Environmental Regulations, Cost as a Determinant of Compliance; Negotiated Compliance MSEs.

1. Introduction

Micro and Small Enterprises (MSEs) constitute a high percentage of the manufacturing sector in Kenya and have been recognized as key drivers of economic development, employment and wealth creation (Republic of Kenya, 2005). Documented information by the Government of Kenya indicates that MSEs collectively account for a sizeable proportion of employment which, for instance, in 2005 stood at 20% of the total employment in Kenya (Republic of Kenya, 2006). The large majority of manufacturing industries including MSEs depend on natural resources for their sustainability (Republic of Kenya, 2006). This notwithstanding, it has been observed that development may give rise to environmental problems that undermine the very resources that support it such as air and water pollution arising from industrial activities (Muthoka *et al.*, 1990).

According to United Nations Environment Programme (UNEP) and Micro and Small Enterprise Programme, MESP (2001), many MSEs in manufacturing sector, although small individually, collectively they have significant negative impact on the environment; contributing to as much as 50% of the total pollution in Kenya.

This coupled with increased numbers of the MSEs in the sector poses serious threats to natural resources on which they depend for their sustainability. In addition, statistics show that non-compliance with environmental regulations degrade the environment which has a negative impact on human health and their well being. Studies have shown that prevalence of certain cancers has been attributed to carcinogens due to plastic burning without complying with the laid down environmental regulations (UNEP & MESP, 2001). Kenya Vision 2030 strategy Paper (Republic of Kenya, 2007) emphasizes that Kenya should be a nation living in a clean, secure and sustainable environment by 2030.

Not surprisingly, therefore, regulatory authorities require that negative environmental impacts including those caused by MSEs in the manufacturing sector must be controlled (UNEP&MESP, 2001). Accordingly, strict attention should be paid to all kinds of industries that affect natural resources use through pollution and other effects to ensure sustainable availability of resources for the sector. According to Republic of Kenya (2000), all enterprises, including MSEs in the manufacturing sector, should comply with these environmental regulations by taking environmental audit and rectifying the activities which could be detrimental to the environment. This means that entrepreneurs should comply with all the environmental regulations regardless of the size of their enterprises in order to mitigate consequences of non-compliance such as being excluded from information, resources, international markets and closure of the business (Joshi, 2006; Malik, 2002).

The sectoral allocation of environmental regulatory costs as reported by Hazilla and Kopp (1990) indicated that a significant percentage (54%) is borne by the manufacturing sector. The implication is that manufacturing industries without proper policies in place may be impacted negatively by the compliance burden. In a developing country like Kenya where majority of manufacturing industries are in the MSEs category, favourable policy intervention by the state is desirable. This will ensure that individual manufacturers' compliance with environmental regulations does not compromise business growth momentum and financial stability. However, various studies have indicated that regulatory requirements that come with costs and limitations create un-conducive environment for the growth of MSEs (Dollinger, 2002). A case in point is regulatory costs emanating from environmental legislations.

The costs of regulations are many and varied and include administrative and enforcement costs by the regulatory authorities, direct costs on businesses, indirect costs arising from market distortions and compliance costs including understanding regulations, applying for licenses and opportunity costs (K'Obonyo *et al.*, 1999; Maalu *et al.*, 1999). A study by the Kenya Association of Manufacturers (KAM, 2006) showed that cost of environmental management in majority of the firms interviewed was high. USAID (1995) established compliance with the regulations as a key constraint faced by manufacturing industries and argued that firms without proper policies in place may be impacted negatively by the compliance burden. KAM (2006) showed that cost of environmental management in the majority of manufacturing firms was relatively high and thus agreeing with the findings by USAID. Some other studies (Tucker & Kasper, 1998; Murray, 1999) showed that significant amounts are committed towards the implementation of environmentally friendly decisions and compliance with environmental laws and regulations and therefore concurred with USAID (1995).

Crain (2005) agrees with the above authors by arguing that compliance with environmental regulations increases net operational cost in small businesses, thus risking their survival. Further Crain observed that ERs compliance might actually result in the redirection of resources away from investment and hence impacting negatively on MSE sustainability. This would be inconsistent with the spirit of ERs that has never been to limit the growth of MSEs but to make sustainable use of environmental resources. The implication is that government should work closely with MSEs and provide protectionist policies that will nurture them into vibrant big businesses.

Petroni (2001), agreeing with Crain (2005), alludes that the costs of implementation of elements of cost may actually lead to collapse of a business. A study by Joshi (2006) supported these views by showing that the cost of compliance with various regulations tend to be disproportionately higher for the MSEs even in the developed countries. However, UNIDO-UNDP (2001), took a view which differed from the above authors by arguing that compliance with environmental audit assists enterprises to keep costs of environmental management down in the long run through implementation of cleaner production techniques and technologies. Although the above studies showed that cost influenced compliance with ERs, a clear distinction of the elements of cost of compliance, which would be expected to influence compliance, was not established.

Furthermore the elements of cost of compliance may vary from one sub-sector to another. Hence the gap identified was lack of information on the key elements of cost of ERs compliance for manufacturing MSEs in Kenya and more so after commencement of enforcement of the Environmental Management and Coordination Act (EMCA) in 2004, considering that the effect of this regulation may not have been widely felt at the time the KAM study was undertaken. In addition there was no information on the key elements of compliance by sub-sectors. This research paper examines cost as a determinant of compliance with environmental regulations by micro and small enterprises (MSEs) in the manufacturing sector in Nairobi City, Kenya. It is based on a survey research undertaken to determine the factors influencing compliance with environmental regulations by MSEs in the manufacturing sector in Nairobi City, Kenya.

2. Methodology

This paper is based on a survey research that adopted a mixed research design. The target population was 358 manufacturing MSEs from which a sample of 10% (36 MSEs) was selected by stratified random sampling. Data was collected by administration of questionnaires to the MSEs supplemented by interviews and observation schedule. Data was analysed quantitatively using SPSS and qualitatively based on the emerging themes. The study considered MSEs compliance with ERs as the dependent variable. Cost of compliance was considered as an independent variable alongside others that included awareness of environmental regulations, experts capability, perceptions of benefits of compliance and business premises ownership. The logistic regression model was postulated based on Agarwal (1991) as follows:

$$\text{Logit (Compliance)} = \beta_0 + \beta_1 \text{Awareness} + \beta_2 \text{Cost of ERs compliance} + \beta_3 \text{Experts Capability} + \beta_4 \text{Perceptions of Benefits} + \beta_5 \text{Property Ownership}$$

Based on this model the following Null and Alternate hypotheses on the logistic regression coefficient, β_2 , for Cost of ERs compliance were postulated and tested:-

$$\text{Null hypothesis: } H_0 \quad \beta_2 = 0$$

$$\text{Alternate hypothesis: } H_1 \quad \beta_2 \neq 0$$

The significance of the regression coefficient β_2 and the goodness of fit of the model was tested using the Pearsons Chi-square Test.

3. Results and Discussion

The study identified effluent disposal, solid waste disposal, cost of retaining official experts and protective gear as the key elements of cost of compliance for manufacturing MSEs in Nairobi. The surveyed enterprises reported varying degrees of difficulty to implement various elements of cost of ERs compliance as presented in Figure 1. Effluent management proved to be the most difficult (30%) followed by solid waste management (23.3%). The reasons given for this difficulty was mainly due to the prohibitive costs (40%). Other reasons included complex technology and lack of appropriate skills (Figure 3). The difficulties in implementing elements of cost of compliance showed variation by sub-sector (Figure 2).

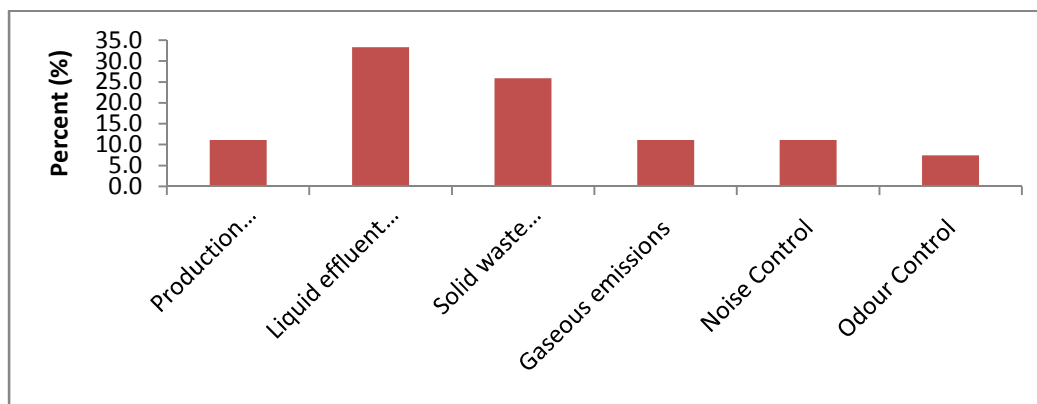


Figure 1: Elements of Cost of ERs Compliance found Difficult to Implement

For manufacturing in leather and footwear, solid waste, liquid effluent and odour were difficult elements of cost to deal with (100%). Paper and paper board found production elements difficult to implement. Plastics and rubber had problems (50%) implementing noise control. It was therefore established that by sub-sector food beverage and tobacco, leather and footwear, plastics and rubber had significant difficulties in implementing the major elements of cost of compliance with ERs. This could have a negative impact on the environment thus damaging other resources which are vital for production and sustaining life.

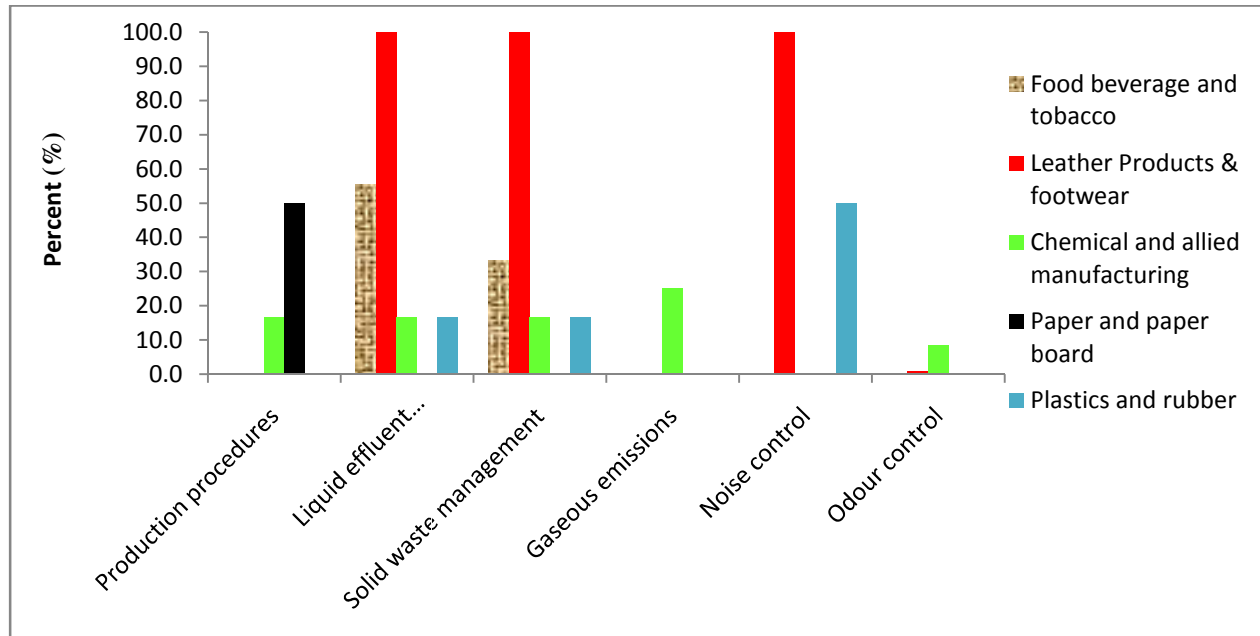


Figure 2: Elements of Cost of Compliance with ERs Found Difficult to Implement by Sub-Sector

3.1 Causes of constraints

The respondents were also asked the causes of constraints that made it difficult to implement some elements of compliance. The responses are presented in Figure 3.

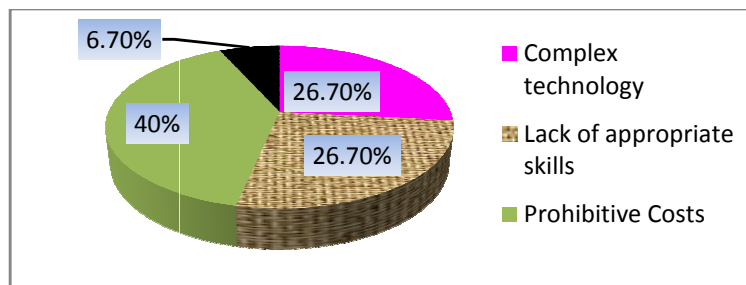


Figure 3: Constraints that made it Difficult to Implement Some Elements of Cost of ERs Compliance

The results showed that costs of compliance on various elements of cost influence compliance with ERs (Figure 4). Respondents in the food and beverage and tobacco, chemical and allied manufacturing and plastic and rubber categories singled out prohibitive costs as a key constraint to the implementation of various ERs elements of cost.

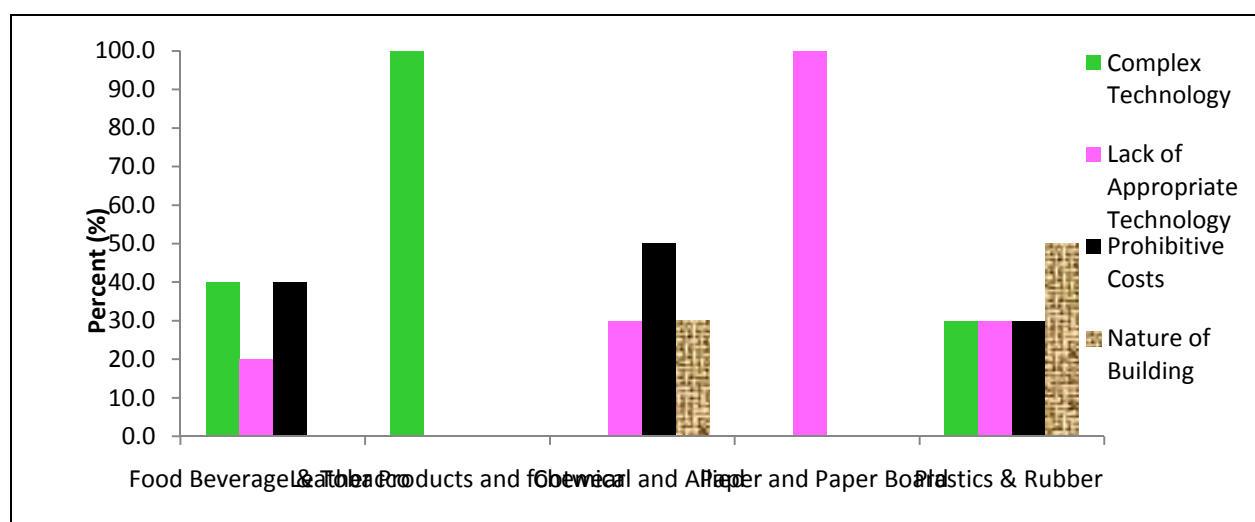


Figure 4: Constraints that Made it Difficult to Implement Some Procedures by Sub-sector

Since the NEMA directive of 2004 that enterprises undertake annual environmental audits (EAs), it would be expected that between 2004 and 2009, for instance, the enterprises concerned should have conducted at least five EAs. This would of necessity occasion annual recurrent costs. A majority 75% of the enterprises surveyed had undergone an external environmental audit assessment between 2 and 5 times, indicating clear efforts to comply with the directive by the majority of MSEs. Only 21.4% indicated that they had undergone the same less than 2 times since start of business. The results are presented Table 1.

By sub-sector the majority of enterprises had undertaken EAs between 2 and 5 times. A minority of 3.57% accounted for by plastics and rubber and chemical and allied manufacturing reported to have conducted EAs more than 5 times. However these could have been repeat EAs probably as a result of non-approvals from NEMA (Figure 5).

Table 1: Number of External Audits Since Start of Business

	Frequency	Percent (%)
Less than 2	6	21.42
Between 2 and 5 times	21	75.0
More than 5 times	1	3.57
Total	28	100

The results presented in Table 1 and Figure 5 show that the number of environmental audits and their frequency increased. This indicates increase in the cost of compliance with EAs and hence ERs.

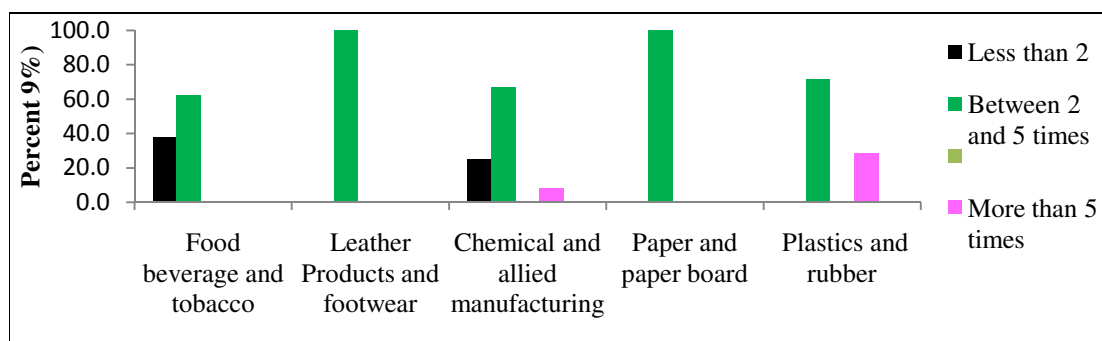


Figure 5: Frequency of External Environmental Audit by Sub-sector

3.2 Areas of Strengths on Compliance Procedures

Asked the areas with noted strengths as per EA reports, it was established that while 63.33% of the enterprises were found to be strong in implementing production procedures, the overwhelming majority were not so strong in implementation of other elements of cost of compliance (Figure 6).

It was observed that only production procedures may be associated with profitable operations while implementing the other procedures actually add to the enterprise costs. This may explain the relatively lower compliance level of the other elements of cost compared to production procedures. Hence it may be deduced that MSEs put more emphasis on implementing elements of cost with direct and immediate gains such as profitability while those without direct gains such as compliance with solid and liquid waste management were given little attention.

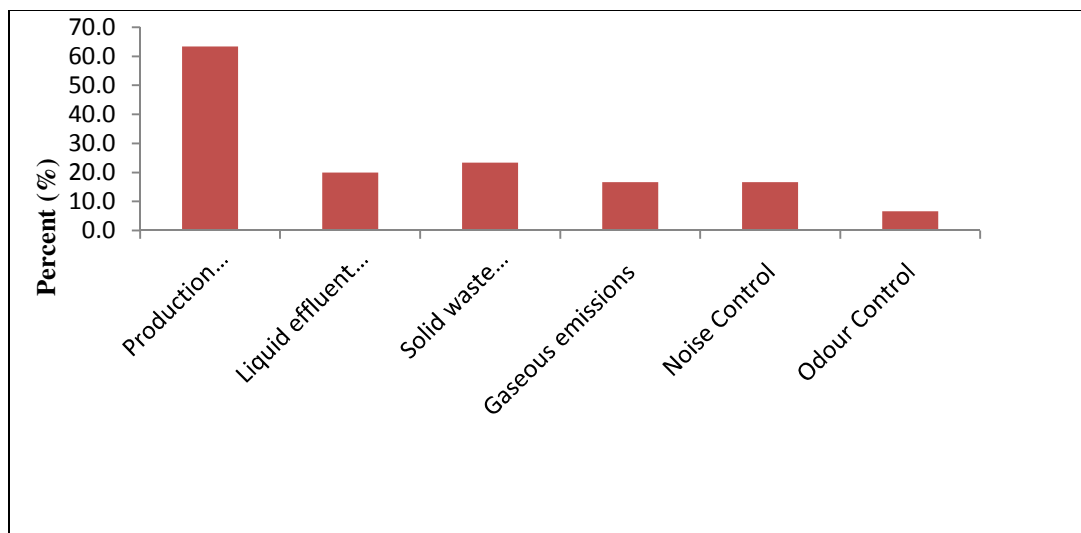


Figure 6: Elements of Cost of ERs with Noted Strength as per EA Reports

A summary of the strengths noted in the audit reports in the enterprises in the various sub-sectors are presented in Figure 7.

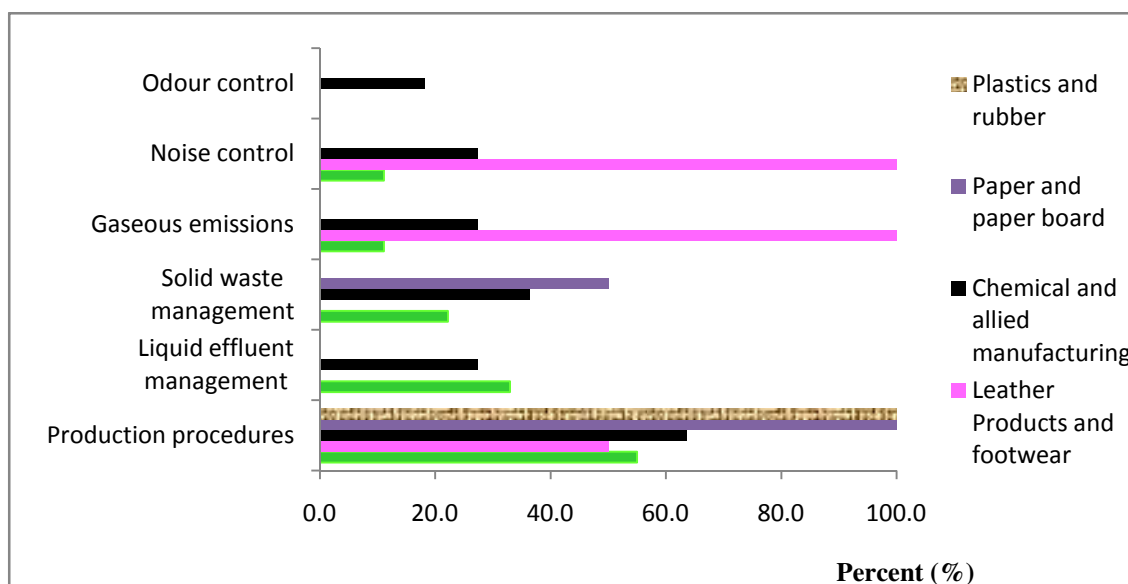


Figure 7: Elements of Cost of ERs Compliance with Noted Strengths by sub-sector

Leather and footwear were found to be strong in production procedures, gaseous emissions and noise control. Plastics and rubber, paper and paper board, chemical and allied and food, beverage and tobacco manufacturing were strong in production procedures but generally weak in the rest of the procedures.

Paper and paper board were strong in production procedures and solid waste management attributable to waste recycling. Recycling wastes generally results in profitability and thus reducing the cost of complying with the ERs associated with that waste. This may explain why paper and paper board were strong in solid waste management.

The findings tallied with areas recommended for special attention for improvement. As per the recommendations in EA reports, production procedures were identified for improvement in only 10% of the MSEs. Areas with less strength mainly solid waste management and liquid effluent management were identified in 30.0% and 26.67% of the MSEs respectively and were highly recommended for special attention (Figures 8 & 9) showing that the majority of MSEs had not complied with implementation of these elements of cost of compliance.

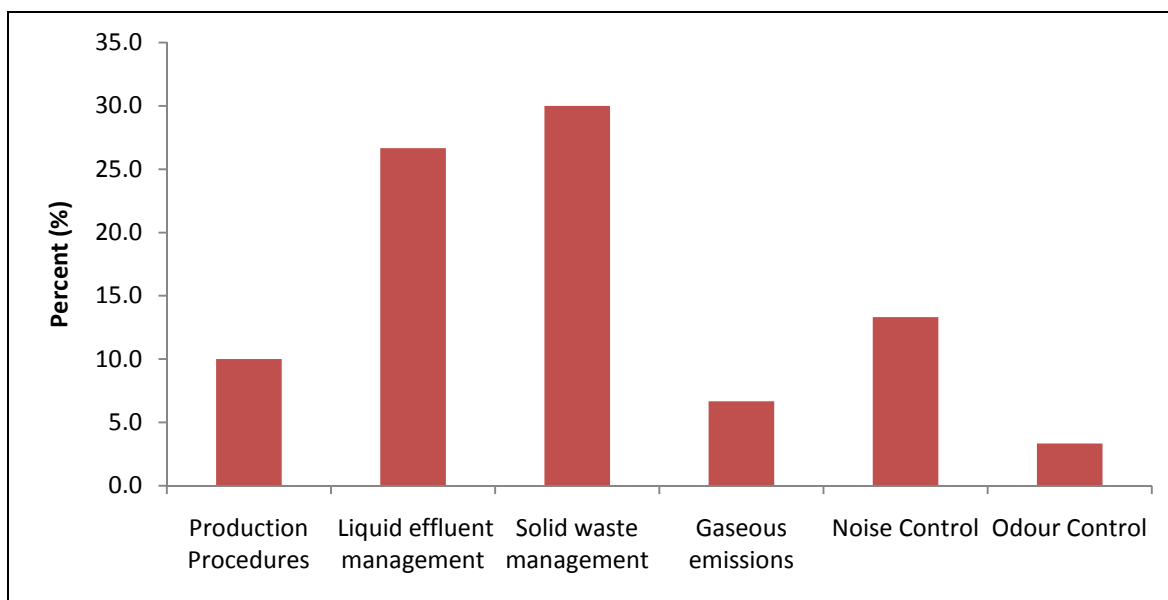


Figure 8: Elements of Cost of ERs Compliance Recommended for Special Attention

Chemical and allied, plastics and rubber, food, beverage and tobacco manufacturing had the least areas recommended for rectification. Leather had the highest number of areas recommended for rectification. These were liquid and solid waste disposal in addition to odour control as presented in Figure 9.

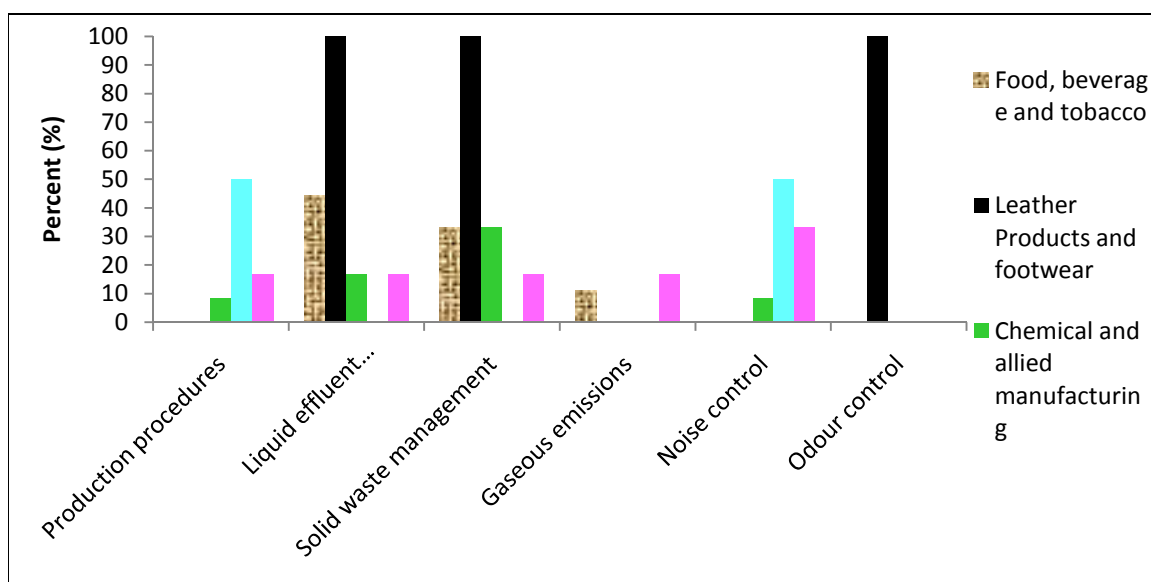


Figure 9: Elements of cost of ERs Compliance Recommended for Special Attention by Subsector

3.3 Level of Fulfillment of Key Elements of Cost of Compliance

On fulfillment of the recommendations to improve implementation of some elements of cost, entrepreneurs were asked to indicate the level of fulfillment by indicating whether fully, halfway, quarterway or no fulfillment. A summary of the fulfillment level is presented in Figure 10. In the majority of MSEs the fulfillment levels varied from fully fulfilled, halfway, quarterway and no fulfillment in implementation of elements of cost of compliance as pointed out by NEMA experts.

Of the areas recommended for rectification, production procedures were fully fulfilled in most of the sub-sectors. However, although liquid effluent and solid wastes were the most highly recommended for special attention across the sub-sectors, they were only halfway implemented by the time of this study. In some other cases there was low fulfillment of liquid and solid waste management, noise control, gaseous emissions and odour control. Noise pollution though recommended for special attention was found difficult to reduce.

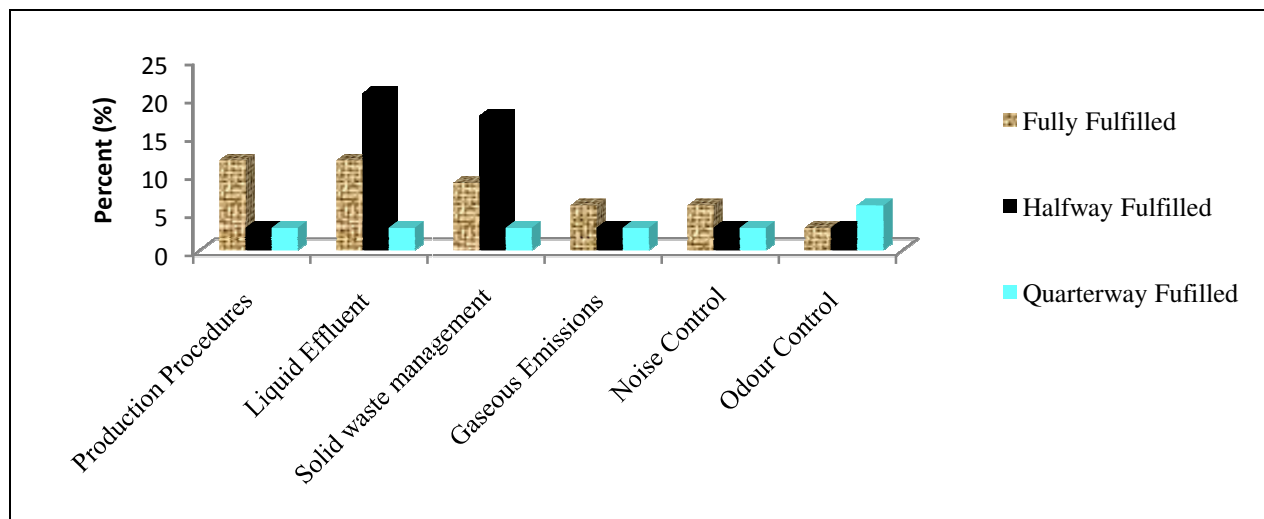


Figure 10: Level of Fulfillment of Key Elements of Cost of Compliance

The reasons cited by those not fully complying was the cost which was unaffordable in addition to complex technology and lack of skills (Figure 11).

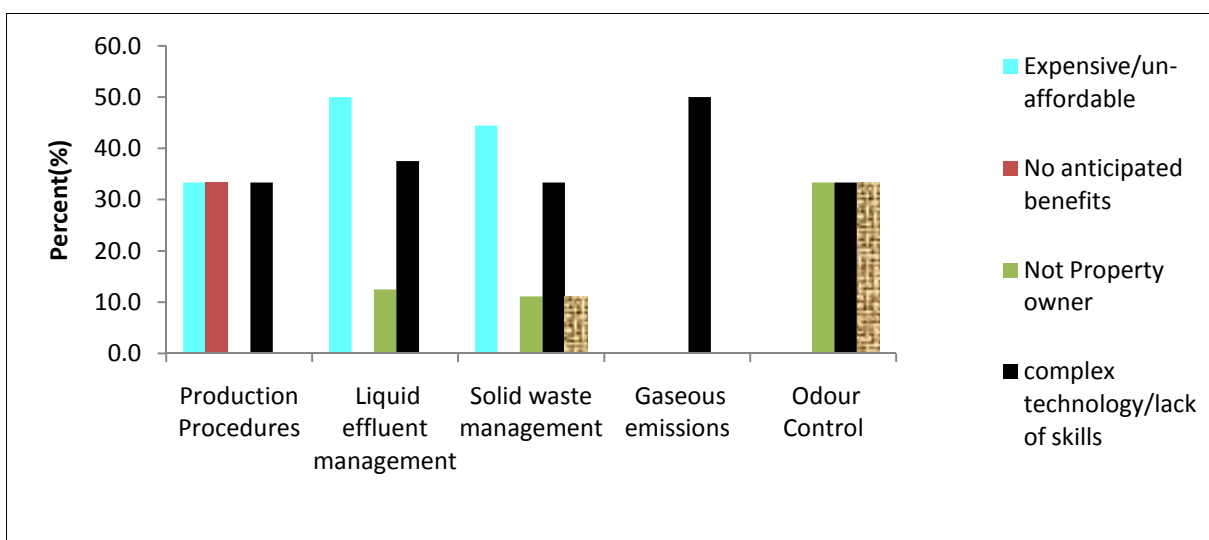


Figure 11: Reasons for Non-fulfillment

NEMA was in agreement that some MSEs used old technology producing a lot of waste. Hence it was apparent that entrepreneurs focused more on production procedures in order to increase their profits regardless of the effect of wastes to environments. Therefore, cost of implementation of cost, complex technology and technical skills were the key reasons for non-fulfillment of the recommended elements of cost for improvement.

The major elements of cost of compliance were effluent disposal followed by official experts and protective gear as presented in Figure 12 and Table 2. Air cleaning, travelling, time and compound aesthetics were minor elements of cost of compliance.

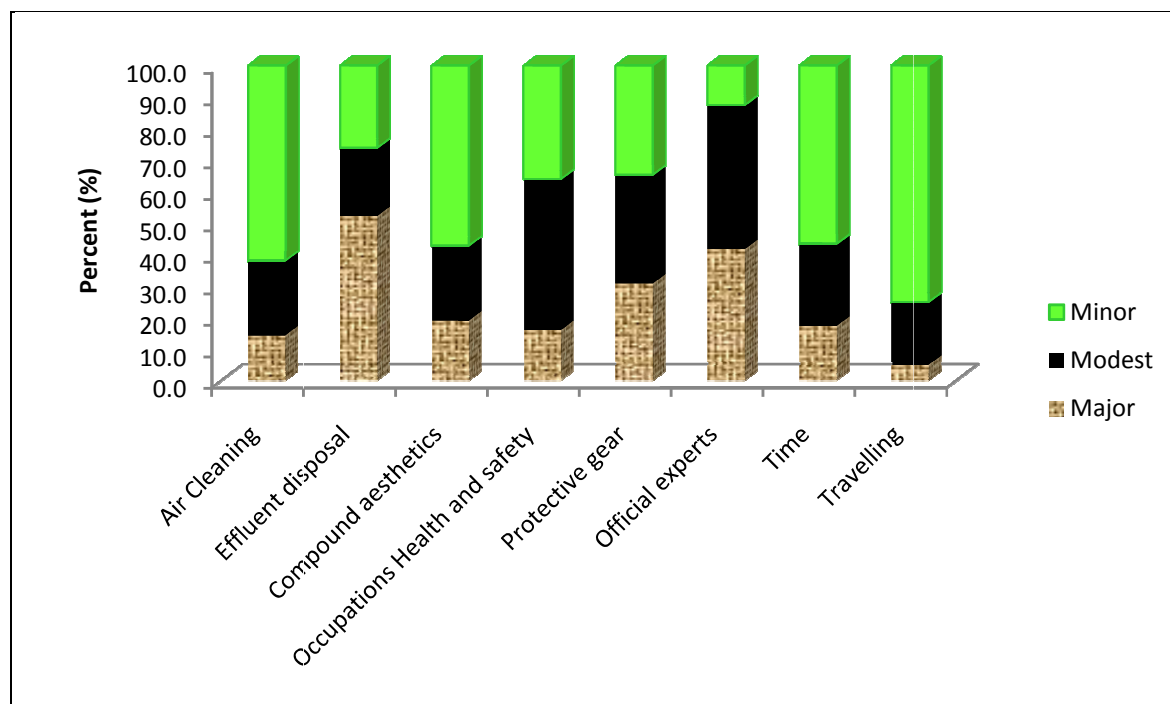


Figure 12: Major Elements of Cost of Compliance

A summary of the major elements of cost of compliance by sub-sector are presented in Table 2. Effluent disposal was a major cost element for all sub-sectors except for chemical and allied and paper and paper board which were rated as modest and minor. Payment of experts services was major in food beverage and tobacco, leather products and footwear and chemical and allied manufacturing and minor for paper and paper board and plastics and rubber. Protective gear was a major cost element in leather products and footwear and chemical and allied manufacturing. Occupation health and safety was modest in all sub-sectors except paper and paper board which was minor. Compound aesthetics was minor except in food, beverage and tobacco and plastics and rubber where it was modest.

Table 2: Major Elements of Cost of Compliance by Sub-sector

	Cost	Food Beverage and Tobacco (%)	leather Products and Footwear (%)	Chemical and Allied Manufacturing (%)	Paper and Paper Board (%)	Plastics and Rubber (%)
Air Cleaning	Major	12.5				50
	Modest	37.5		12.5		25
	Minor	50		87.5	100	25
Effluent Disposal	Major	60	100	22.2		75
	Modest	10		33.3		25
	Minor	10		44.4	50	
Compound Aesthetics	Major	28.6		14.3		25
	Modest	42.9				50
	Minor	28.6		85.7	100	25
Occupation Health and Safety	Major			33.3		25
	Modest	44.4	100	44.4		75
	Minor	55.6		22.2	100	
Protective Gear	Major	22.2	100	40		25
	Modest	33.3		20	50	75
	Minor	44.4		40	50	
Experts Payment of Services	Major	44.4	100	44.4		33.3
	Modest	33.3		44.4	100	66.7
	Minor	22.2		11.1		
Time	Major	22.2		12.5		14.3
	Modest	33.3		25		
	Minor	44.4	100	62.5	100	85.7
Travelling	Major	14.3				
	Modest			28.6		66.7
	Minor	85.7	100	71.4	100	33.3

For triangulations, it was observed that most MSEs had EA reports which indicated the areas of strength and areas where improvements were required. Majority had protective gear and were equipped with occupations health and safety attire. As for production wastes disposal, many had contracted solid waste transporters who would clean and dump the wastes at the dumping sites authorized by NEMA. The entrepreneurs cited all these as the major costs of compliance.

From this study, it was established that cost of compliance, complex technology and lack of skills were key reasons for non-compliance with ERs. The cost of implementing some of the elements of cost was prohibitive and therefore MSEs could not afford to implement. Some of the technology required to implement some of the elements of cost of compliance such as odour, noise and gaseous emissions were too complicated for the MSEs to understand and therefore could not be fully implemented. Regarding the lack of skills some MSEs did not have adequate personnel with the required technical know-how in order to implement the elements of cost of compliance.

Agreeing with Crain (2005), the cost of compliance with ERs was cited by most MSEs as a major contributor to the cost of compliance with effluent disposal as a major cost (50%), followed by official experts cost (42%) and protective gear (32%).

3.4 Minimizing Cost of Compliance

Asked whether any MSEs in the manufacturing sector had been forced to close down or to change line of activity due to cost of compliance, KAM answered in the negative since they had agreed with NEMA on negotiated compliance where sufficient time to work towards implementation of ERs should be given to MSEs especially where change of technology was required.

Asked what it is doing to ensure that cost of compliance is kept at minimum levels possible, the reply was that KAM is lobbying for industry categorization on risk based approach which means that industries that are highly polluting will have higher compliance cost. NEMA concurred with KAM, that they allow negotiated compliance where they agree in writing with the enterprise management which find it difficult to comply. To reduce cost, NEMA advises MSEs to concentrate on core business and outsource other activities to avoid overstressing themselves such as concentrate on manufacturing only and outsource waste transportation.

Where MSEs were unable to comply with ERs due to the associated cost of compliance, NEMA was flexible and had come up with negotiated compliance which is expected to come in handy to save such enterprises. In negotiated compliance, entrepreneurs are allowed more time to comply where the agreement between NEMA enforcement officers and the management of the non-complying MSEs is put in writing. If not complied at the negotiated time, NEMA officials enforce the law in the way they deem it best according to the laid down disciplinary actions.

KAM (2006) revealed that although the amount of money spent on environmental management was high in the long run, the cost reduced due to cleaner production techniques and technologies. The entrepreneurs, agreeing with KAM, asserted that compliance with EA assists enterprises to keep costs of Environmental management down through implementation of cleaner production techniques and technologies. This was cited by a number of enterprises who after complying found that cost of compliance reduced and performance improved. This was achieved by reduction in production costs through waste reduction at the source. Reduced cost of production would lead to higher profits and hence MSEs growth.

3.5 Enforcement of Non-compliance

Compliance is enforced through arrest and prosecution of the offenders which could lead to closures of an enterprise after the expiry of the negotiated compliance date. NEMA inspectorate unit had 10 inspectors charged with the responsibility of inspecting and prosecuting non-complying MSEs operators. An example of such a scenario was the case of the Dagoretti slaughter houses which had negotiated for six months to comply. After six months, all those slaughter houses which had not complied were closed down and were reopened only after complying. To comply, the slaughter houses had to build liquid effluent treatment lagoons which they found too expensive. To take the effluent to the City's Central Waste Treatment Plant, MSEs had to pay KShs.10,000 per trip. Solid waste was transported by a tractor trailer at a cost of KShs.1500 per trip. Other expenses included hand carts which transported blood at KShs.800 per trip. Besides, inspection fee had to be given to the veterinary doctors. According to the slaughter house management, operations expenses were too high.

3.6 Un-Conducive Environment for Growth

The results of this study concur with previous studies in this area which had indicated that regulatory requirements that come with costs and limitations create un-conducive environment for the growth of MSEs. A case in point was regulatory costs emanating from environmental legislations (UNEP - MESP, 2001). According to the United States Agency for International Development (USAID, 1995) various constraints that hindered development of MSEs in Kenya were identified and ranked. Unconducive legal framework, including ERs compliance, was the highest constraint with 53.2%. Significant amounts of resources are committed towards the implementation of environmentally friendly decisions and compliance with environmental laws and regulations (Tucker & Kasper, 1998; Murray, 1999).

3.7 Logistic Regression Model Fitting and Influence of Cost on Compliance of ERs

The study also sought to establish the influence of cost of compliance on compliance of ERs by inferential statistics by postulating and testing a logistic regression model. The model considered cost of compliance as an independent variable alongside other variables that included, awareness of environmental regulations, experts capability, perceptions of benefits of compliance and business premises ownership. The model was postulated based on Agarwal (1991) as follows:

$$\text{Logit (Compliance)} = \beta_0 + \beta_1 \text{Awareness} + \beta_2 \text{Cost of ERs compliance} + \beta_3 \text{Experts Capability} + \beta_4 \text{Perceptions of Benefits} + \beta_5 \text{Property Ownership}$$

Based on this model the postulated Null hypothesis, H_0 , and Alternate hypothesis, H_1 , were tested:-

Null hypothesis	$H_0:$	$\beta_2=0$
Alternate hypothesis	$H_1:$	$\beta_2 \neq 0$

The significance of the regression coefficients β_2 and the goodness of fit of the model was tested using the Pearsons Chi-square Test. The results showed that the logistic regression coefficient for cost of compliance, β_2 , was not significant at 5% level of significance. The Null hypotheses was therefore not rejected and it was concluded that cost of compliance did not significantly influence MSEs compliance with environmental regulations at the 5% level of significance. This was further confirmed by the chi-square test, which, according to Agarwal (1991) and Mugenda and Mugenda (2008), can be used to test whether an independent variable is a significant factor influencing the dependent variable. The Pearson's chi-square test results are presented in Table 6.

Table 6: Test of Influence of Independent Variable on ERs Compliance

Independent Variable	Pearson's Chi-square (p-value)
Awareness	0.022
Cost	0.456
Experts' capability	0.006
Perception of Benefit	0.217
Property Ownership	0.939

The results established that of the independent variables only awareness and experts capability were significant factors influencing compliance at the 5% level of significance as indicated by p-values of 0.022 and 0.006 which were below 0.05. It is however crucial to observe that the goodness of fit of the model was not significant when only these two independent variables, awareness and experts capability, were entered into the model. Hence these two independent variables alone could not adequately explain the variation in the dependent variable, compliance with ERs.

However when the cost of compliance with ERs was included the goodness of fit of the model improved. The pseudo R-square increased when cost was entered into the model showing that the added variable, although individually did not singularly have significant influence, nevertheless contributed to improved explanation of the variation in the dependent variable, compliance with ERs.

When all the stipulated factors, including cost of compliance with ERs, were entered into the model the goodness of fit was significant at 10% level of significance with a p-value of 0.085. The parameter estimates and p-values are presented in Table 7.

Table 7: Model Fitting Parameters

		Parameter Estimate	p-value
Threshold	ER Compliance	-3.18	0.05
Location	Awareness	-3.39	0.05
	Experts Capability	-3.73	0.04
	Perception of Benefits	1.39	0.41
	Property Ownership	2.13	0.22
	Cost of Compliance	-1.40	0.35

The following logistic regression model was therefore fitted on the basis of the results of logistic regression analysis:-

$$\text{Logit (Compliance)} = -3.18 - 3.39 \cdot \text{Awareness} - 3.73 \cdot \text{Experts Capability} + 1.39 \cdot \text{Perceptions} + 2.13 \cdot \text{Property Ownership} - 1.40 \cdot \text{Cost of Compliance}.$$

This analysis showed that cost of compliance, although individually did not have significant influence, when included, it nevertheless contributed to the improvement of the goodness of fit of the model. This was well indicated by the increase in the pseudo R-square when cost and the other variables were entered into the model.

This meant that the added independent variables, including cost, contributed to improved explanation of the variation in the dependent variable and hence showed that cost of compliance, amongst the other stipulated independent variables, influences MSEs compliance with ERs. The results of logistic regression analysis and related discussions presented above are therefore in conformity with the results and discussions on the basis of descriptive statistical analysis presented earlier. The study therefore determined that cost of compliance influences MSEs compliance with environmental regulations.

This study agrees with Crain (2005), that compliance with environmental regulations increases net operational cost in small businesses, thus risking their survival. Further Crain argues that ERs compliance might actually result in the redirection of resources away from investment and hence impacting negatively on MSE sustainability. This would be inconsistent with the spirit of ERs that has never been to limit the growth of MSEs but to make sustainable use of environmental resources. The implication is that government should work closely with MSEs and provide protectionist policies that will nurture them into vibrant big businesses.

Petroni (2001) alludes that the cost of implementation of elements of cost may actually lead to collapse of a business. This study concurs with this such as in the case of Dagoreti slaughterhouses in Nairobi, where some enterprises almost collapsed due to non-compliance with ERs which necessitated their closure by NEMA. A study by Joshi (2006) revealed that the cost of compliance with various regulations tend to be disproportionately higher for the MSEs even in the developed countries. Compliance with environmental audit assists enterprises to keep costs of environmental management down in the long run through implementation of cleaner production techniques and technologies (UNIDO-UNDP, 2001).

NEMA concurs with Joshi (2006) that cost of compliance with various regulations tend to be disproportionately higher for the MSEs. In this study it was established that NEMA was attempting to mitigate such impacts on MSEs including those in manufacturing by adopting negotiated compliance approaches. This was in recognition of the fact that the regulatory conditions requiring all MSEs to prove their compliance through annual EAs may be un-conducive or unnecessary because MSEs do not pose the same magnitude of threats to the environment. In this regard NEMA was at the time of the study considering categorizing MSEs according to the threats they posed by non-compliance. Such categorization would mean that some MSEs may not be required to undertake annual EAs and if this be the case their costs of compliance would reduce, thus enhancing their sustainability.

4. Conclusions

The study determined that cost of compliance influences MSEs compliance with environmental regulations. The key elements of cost of compliance identified included effluent disposal, solid waste disposal, cost of retaining official experts and protective gear. Liquid effluent management and solid waste management were found to be the most difficult procedures to implement mainly due to the prohibitive costs. Other reasons included complex technology and lack of appropriate skills.

The majority of manufacturing MSEs in Nairobi conducted EAs regularly and most relied on external experts to conduct the EAs. The implication of this was that enterprises incurred recurrent annual costs in payments to the external EA experts which would be expected to be higher than if there had been an internal capability to undertake the EAs.

NEMA was at the time of the study considering categorizing MSEs according to the threats they posed by non-compliance. NEMA was attempting to mitigate such impacts on MSEs including those in manufacturing by adopting negotiated compliance approaches.

5. Recommendations

The study recommends reduction of prohibitive cost of ERs Compliance by adoption of negotiated compliance taking into account MSEs categorization into high-risk, medium risk and low-risk according to the threats they pose on the environment. Where threats are identified to be low risk, EAs could be reduced as appropriate, for instance once every two years (bi-annual assessment). Further stakeholders should implement interventions to build internal capacity of MSEs to undertake EAs to reduce on costs of external consultants. On cost of compliance, the government should work closely with MSEs and provide protectionist policies that will nurture MSEs into vibrant big businesses.

References

- Agarwal, B.L. (1991). *Basic Statistics*. New Delhi: Wiley Eastern Limited
- Crain, M. (2005). *The Impact of Regulatory Costs on small Firms: US Small Business Administration Reports*. Retrieved on March 18, 2008 from <http://www.sba.gov/advo/>
- Dollinger, M.J.(2002). *Entrepreneurship Strategies and Resources*. New York: Richard D. Irwin.
- Hazilla, M., & Kopp, R. (1990). The Social Cost of Environmental Quality Regulations: A General Equilibrium Analysis. *Journal of Political Economics*, Vol. 98 (4): pp 853 – 783.
- Joshi, G. (2006). *Policy and Regulatory Environment for SME's informality and Poverty Alleviation*. Geneva: ILO.
- Kenya Association of Manufacturers (2006). *A Survey of Kenya's Manufacturing Sector*. Nairobi: Kenya Association of Manufacturers
- K'Obonyo, P., Ikiara, G.K., Mitullah, W., Abuodha, C., Ongile, G., & McCormick, D.(1999). *Complying With Business Regulation in Kenya. Occasional Paper Number 64: Institute for Development Studies*. Nairobi: University of Nairobi.
- Maalu, J., Khayesi, P., Alila, P., Chitere, P., Kibas, P., Karega, M., Bowen, M., & Onjala, J. (1999). *Impact Assessment of the WEDCO Enterprises Development Project: Occasional Paper Number 68. Institute for Development Studies*. Nairobi: University of Nairobi.
- Malik, A. S. (2002). *Impact of Environmental Regulations on the Textile Sector in Pakistan*. Geneva: ILO.
- Mugenda, M. O., & Mugenda, A. G. (2008). *Research Methods: Quantitative & Qualitative Approaches*. Nairobi: Acts Press.
- Murray, P. C. (1999). Inching Toward Environmental Regulatory Reform – ISO 14000: Much Ado About Nothing Or A Reinvention Too? *America Business Law Journal* Vol. 37 pp. 35 – 9.
- Muthoka, G. M., Wanaswa, E. A., Rimbui, Z. K., Rego, B. A., & Mputhia, J.G. (1990). *A Guide on Environmental Education for Secondary School Teachers in Kenya*. Nairobi: UNESCO-KIE-KSTC
- Petroni, A . (2001). Developing a Methodology for Analysis of Benefits and Shortcomings of ISO 14001 Registration: Lessons From Experience Of A Large Machinery Manufacturer. *Journal of Cleaner Production*, Vol. 9 Pp. 351 – 64.
- Republic of Kenya (2007). *Kenya Vision 2030*. Nairobi: Government Printer.
- Republic of Kenya (2006). *Economic Survey*. Nairobi: Government Printer.
- Republic of Kenya (2005). *Sessional Paper No.2 of 2005 on Development of Micro and Small Enterprise for Wealth and Employment Creation for Poverty Reduction*. Nairobi: Government Printer.
- Republic of Kenya (2000). *The Environmental Management & Co-ordination Act (1999)*. Nairobi: Government printer.
- Tucker, R., & Kasper, J. (1998). Pressures for change in environmental auditing and in the role of the internal auditor, *Journal of Managerial Issues*, Vol. 10 No.3, pp.340 -354
- UNIDO-UNDP Kenya (2001). *A compendium of Cleaner Production Case Studies in Kenya*. Nairobi: Kenya National Cleaner Production Centre. The Cleaner Enterprise Programme
- United Nations Environment Programme (UNEP) and Micro and Small Enterprise Programme, MESP (2001). *Micro and Small Enterprises and Natural Resources Use. Proceedings of a Workshop Held at ICRAF Nairobi (21-22 February 2000)*.
- UNEP (2005). *Tools of Environmental Management: EIA/EA Training*. Nairobi: Kenya.
- USAID (1995). *Laws and Regulations Affecting Development and Growth of Micro and Small Enterprises In Kenya*.