



Assessment of the constraints in the environmental management plan of filling stations in Kaduna metropolis, Nigeria

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ABSTRACT

This paper assesses the major constraints to EMP in the environmental management of filling stations in Kaduna metropolis. The specific objectives were to identify factors influencing the implementation of environmental management plan in Kaduna metropolis and proffer solutions to the constraint affecting the implementation of the EMP. Data for the study was obtained from published documents, questionnaire and interview. The result of the study indicated that the Ignorance, Cost of implementation and maintenance, follow-up process, lack record keeping, training and Enlightenment programmes, and uncertainty with the regulatory bodies are the major constraining factors affecting the implementation of EMP in Kaduna Metropolis. Possible solutions that can improve the implementation if the EMP such as involving some of the regulatory officers to assist in filling stations to implement the EMP or during review, environmental management benchmarking, introduction of compliance dependent compliance monitoring and enforcement, and self-reporting schemes are explored.

Keywords: Environmental Management Plan; self-reporting schemes; EMP implementation; constraint; filling stations

1. INTRODUCTION

At present, there are many environmental management tools in use, such as environmental impact assessments, environmental audit, substance flow analysis, life-cycle assessments and environmental management plan. These tools provide environmental information and assist environmental management in order to make organizations more environmentally friendly (Emilsson and Hjelm, 2002). Of these tools, Environmental Management Plan is one of the most commonly used in organizations worldwide (Nawrocka and Parker, 2009). An environmental management plan (EMP) is an organizational plan or programme used in the management of industrial or commercial operations to ensure environmental sustainability (PREPRA, 2015).

Petroleum products are unrivaled resources in several aspect of human life which are mostly obtained from filling stations. Most filling stations are located within densely built urban space because of the need to maximize access to customers, security and ease of transportation among others. Kaduna like many urban areas has many filling stations to satisfy its inhabitants. Important as filling stations are, they are potential sources of environmental hazards. As a way of mitigating such environmental disasters, filling stations are required to mandatorily have an environmental management plan. Genovese, (2004) defined filling station as any petroleum facility that sales fuel and lubricants for engines and motor vehicles. Fuels sold at these facilities include petrol (Premium Motor Spirit [PMS]), Liquefied Natural Gas [LNG], diesel (Automated Gas Oil [AGO]) and kerosene (Dual Purpose Kerosene [DPK]). These fuels are flammable liquids, which can give off flammable vapour, even at very low temperatures. This means there is always a risk of fire or explosion if a source of ignition is present.

Although there have been a considerable benefit in the implementation of the EMP such legal compliance, financial benefits, waste efficiency, reduced pollution emissions, increased profits and sustainable development among others, there is the need to understand that every plan developed to control the environment may confront management with new challenges that cannot be overlooked. This brings to bare the importance to consider the major constraining factor affecting the implementation of EMP in Kaduna.

Any step involving the achievement of good environmental quality, inevitably involves some costs (Famiyeh, Kuttu & Anarfo 2013). There are two costs, the cost of implementation and the cost of maintenance of the EMP. The implementation costs include costs incurred from activities a company undertakes to comply with the EMP which involves planning, identifying impacts and develop management plans, training and awareness, communication, documentation and document control, environmental functional reviews, miscellaneous and the registration process. The maintenance costs however comprises the cost incurred in monitoring the EMP, records related to the EMP, auditing and the cost involved in reviewing the EMP to enable continual improvement. Human rather than financial resources are the major barriers impeding EMP implementation, (Poole, Coombs, & Van Gool, 1999; Goodchild, 1998).

Apart from the costs involved, the institutional arrangements and polices can in some ways affects the number of organizations implementing an environmental management plan. In the global market place companies consider institutions and public policies to be critical elements of the business environment. The institutional environment which creates the rules of the game among economic agents influences an agent's ability to efficiently contract with

other agents (Williamson, 1996). This in most cases put constraints on industrial organizations, the market in which they operate and the way firms responds to this institutions.

In the environmental arena, the institutional environment is an essential influencing factor for industry because it creates not only the rules of the game, but also the market for environmental products and services. Uncertainty in the institutional environment, such as the behavior of environmental regulatory agencies could prevent filling stations from seeking certification after implementation. For example, regulatory violations by an EMP applicant station might be revealed or disclosed during its environmental certification process and if such violations are used by regulatory agencies or other third parties against the applicant industry, then such legal proceedings would result in additional cost of certification to the applicant station.

Furthermore, the process of environmental monitoring of filling stations and certification of filling stations may inadvertently lead to the discovery of non-compliance with applicable environmental regulations. Companies forcing to be in compliance with environmental laws and regulations always think of the identification of violations during the implementation phase, self or third-party audits can lead to real liabilities to the industry.

Whilst there is considerable research works examining the impact of filling stations to the immediate surrounding (Morales, Minarro, Feradas, Laracena and Rico 2010), effect of oil spillage on soil and environment, (Bello and Anobeme 2015), safety practices in filling stations (Afolabi, Olajide and Omotayo 2015) little has been In examining the constraint to EMP implementation in filling station in kaduna. Given the importance of filling stations in supply of fuel product and the role of EMP in the environmental management of filling stations, suggests the need for assessing the major constraint to EMP in the environmental management of filling stations in Kaduna metropolis.

2. AIM AND OBJECTIVES OF THE STUDY

The aim of this paper is to assess the major constraints to EMP in the environmental management of filling stations in Kaduna metropolis. To achieve this central aim the following objectives were pursued: Identifying factors influencing the implementation of environmental management plan in Kaduna metropolis and proffering solutions to the constraint affecting the implementation of the EMP.

3. STUDY AREA

Kaduna metropolis is located between latitudes 10°25 N and 10°36 N and longitudes 7°23 E and 7°29 E), as shown in figure 1. It shares common boundaries with Igabi local government to the northwest and northeast, and Chikun local government to the south east. Kaduna metropolis consists of two local governments (Kaduna north and south) and parts of other two Local Government- Chikun and Igabi local government. The city was founded by Sir Frederick Lugard in the colonial era as a strategic military and administrative base from what was initially a cluster of villages (Lock, 1968).

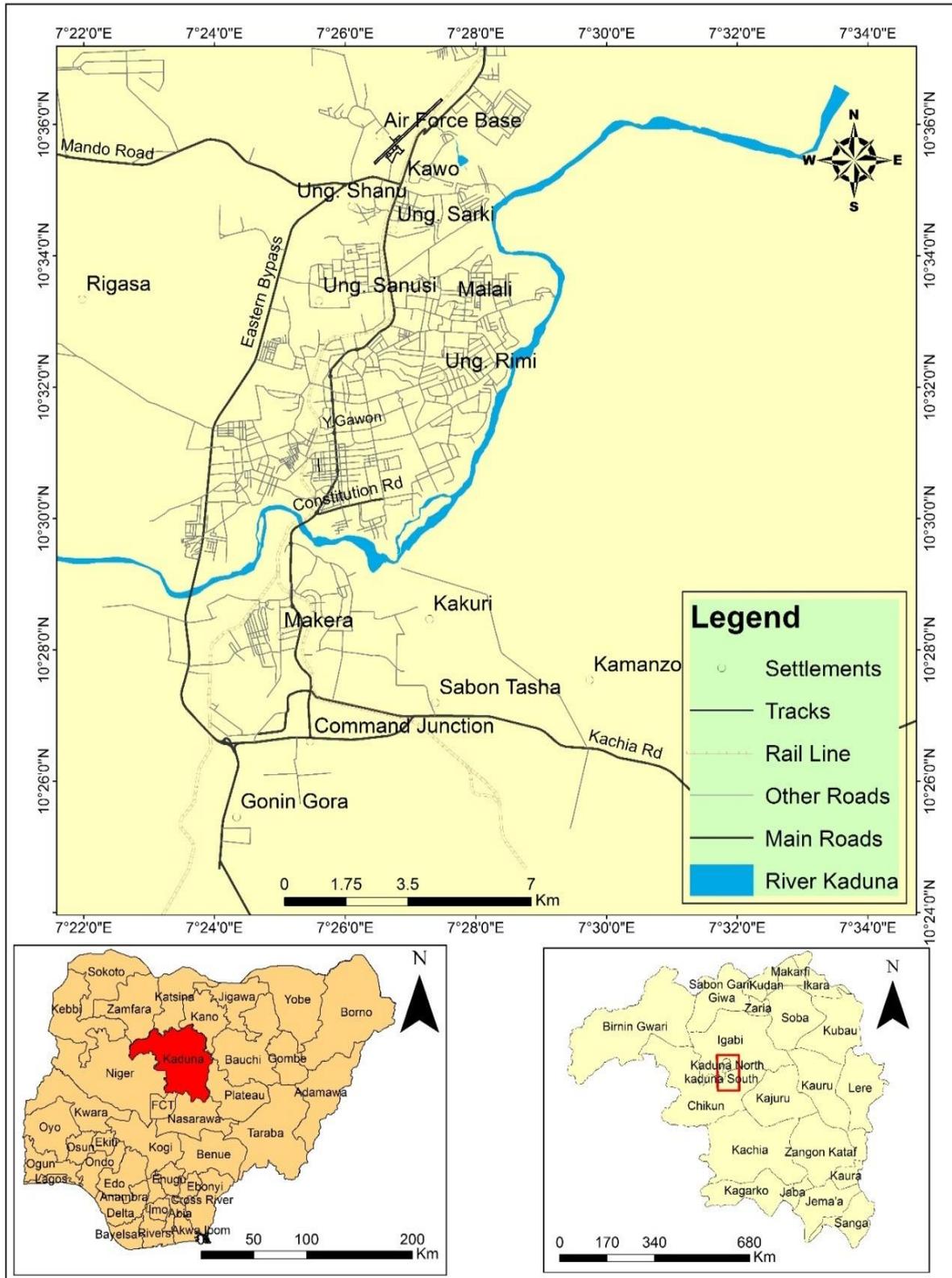


Figure 1. Map of Kaduna showing the study area

Source: Quickbird Image, 2014.

Kaduna, the capital of Kaduna state, is one of the most important political, industrial and economic centres in Nigeria. It is also one of the most populous millennium cities and serves as the most important trade and transportation centre in the northern Nigeria. Kaduna is a city characterized by rapid urbanization, rising numbers of cars, filling stations and degradation of local environmental assets. The Zonal office of DPR is responsible for the environmental monitoring of filling stations within the metropolis and environs. It shares this responsibility with Kaduna Environmental Protection Agency (KEPA) and the Environmental Health Offices of the four local governments.

4. RESEARCH METHODOLOGY

The sampling frame for this study is the management staff of the filling stations. Information from DPR shows that there are 286 filling stations within the nook and crannies of the metropolis (26 mega stations, 58 major marketers and 206 independent marketers). However, having determined the sample frame, Stratified sampling was used in selecting the filling stations for this study. The filling stations were divided into three strata based on the ownership, which is NNPC managed stations, major and independent marketers. In each of the strata, a random sampling method was used for the selection of filling stations where respondents will be sampled, where 10% of each of the strata was randomly selected which gives a total of 3, 6 and 21 respectively.

In administering the questionnaire, a purposive sampling technique was used to identify the targeted respondent from each of the filling station. Managers of the filling stations will therefore be sampled. The data collected for this study was analysed and presented using frequency tables, charts and percentages.

5. RESULTS AND DISCUSSION

5. 1. Availability of EMP in the Filling Station

Table 1 present the details of the analysis of the availability of EMP as a tool in managing operations in the filling stations.

Table 1. Availability of EMP in the Filling Station.

EMP	NNPC Managed Stations	Major Marketers	Independent Marketers	Percentage
Yes	-	2	4	20
No	3	4	17	80

Source: Field Survey 2016.

As shown in Table 1, 80% of the filling stations indicated not having an environmental management plan while only 20% indicated that they have. Availability of EMP in filling stations will make environmental management easier and more natural for everyone who is involved in it at the station. When made available attendants appreciate that the EMP spells out exactly what is expected of them. Majority of the managers lack of awareness of the EMP as a tool for guiding filling stations operation. The EMP will provide a framework to ensure that operations in the station are in compliance with environmental regulation. However, table 1 shows the percentages of the filling stations with their EMP physically on site. The proportion of the defaulters is unacceptably high.

5. 2. Unit that ensure implementation of mitigation measures

For a functional EMP in filling stations, roles, responsibility and authorities should be defined, documented and communicated in order to facilitate effective environmental management. A specific management representative should be appointed to ensure the environmental management plan established and implemented. Table 2 shows the availability of units that ensures implementation of mitigation measures in the filling stations.

Table 2. Unit that ensure implementation of mitigation measures.

Unit	NNPC Mega	Major Marketers	Independent marketers	Percentage
Yes	1	6	3	33
No	-	-	14	47
Silent	2	-	4	20

Source: field survey 2016.

Consequently, 33% of the filling stations have units that ensure the implementation of mitigation measures, 47% admitted that they don't have while 20% were indifferent on the issue. With respect to the percentage of the filling stations who asserted that there are unit that ensure implementation of EMP (33%) is indeed, below average and can say that there is poor implementation of EMP within filling stations in the study area. This serves as a major constraining factor to EMP and therefore hinders EMP implementation. The finding also agrees with the work of Walker, Redmond and Goeft, (2007) that identified only 26% of industries implemented environmental management plan in Australia.

5. 3. Training Programmes for Workers

The availability of training programs for workers is illustrated in Figure 3.



Figure 3. Availability of Training Programmes for Workers
Source: field survey 2016

Based on the survey, 53% of the filling stations have training programs for their workers where as 47% lack this requisite requirement. This is found to be a major constraint to EMP implementation since training and enlightenment is crucial in raising environmental protection and safety in filling stations. This is in conformity with EFOA, (1999) that safety of people and protection of the environment should at all time be the major concerns at petrol stations because they are potentials for accident especially where the general public has unrestricted access.

Also, based on the distribution of the 53% of the filling stations that have training programmes for workers, 25% give training yearly, 38% monthly while 6% give training weekly. However, 31% give training prior to employment. Inconsistency in the training field could reduce the implementation of the EMP.

5. 4. Recording of Reports, Injuries, Accidents, Diseases and dangerous Occurrences

Figure 4 shows the percentages of filling stations that records reports, Injuries, Accidents, Diseases and dangerous Occurrences.

Only 17% of the filling stations keep record of reports, injuries, accidents, diseases and dangerous occurrences, 30% sometimes keep record, while 53% don't keep record at all. Several activities and occurrence in filling station requires keeping of record as stipulated in the regulation. These low percentages in record keeping are also against standard health, safety and environmental protocols and an absence of environmental monitoring and best practices and serves as a constraint to EMP implementation. Maintaining up-do-date written procedures and occurrences is good management practice which is therefore mandatory for all operators to engage in.

In one of the sampled filling stations that experienced a leakage case with one of the USTs, neither the filling stations nor DPR have record of the occurrence in addition to using inappropriate method of solving the problem. This is against the standard for operation of filling station since all cases of leaks are to be reported to DPR thereafter the affected USTs should be repaired or replaced. Base on this finding therefore, it appears that the lack of recording and reporting could be attributed to the fear of the cost of cleaning or follow-up measures by the service providers. It is true that implementation and maintenance cost together with too much paper work happens to be parts of the major constraining factor to EMP implementation (Famiyeh, Kuttu and Anarfo, 2013).

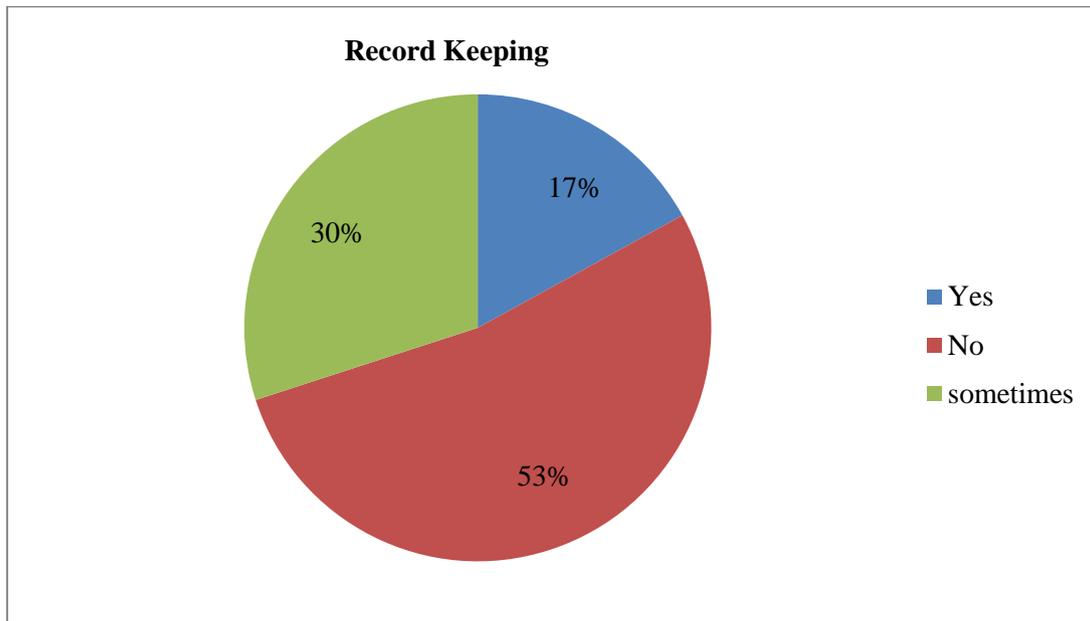


Figure 4. Recording of Reports, Injuries, Accidents, Diseases and dangerous Occurrences
Source: field survey 2016

5. 5. Current Fire Service Certificate in the Filling Station

Fire Service Certificate is one of the criteria that shows the compliance to EMP in filling station, the certificate must be updated with the Federal Fire Service every year.

Table 3. Current Fire Service Certificate in the Filling Station.

Certificate	NNPC Managed Stations	Major Marketers	Independent marketers	Percentage
Yes	2	6	4	40
No	1	-	17	60

Source; field survey 2016

Table 3 shows that 60% of the filling stations do not have an updated certificate while 40% does. However, based on the safety requirement in petroleum tank farm, several requirements must be met in all filling stations before the issuance of such certificate by the service board. Based on the researcher's survey across all forecourts of the filling stations under study, none of the filling stations fully satisfied the requirements, this cut-across even those with the updated certificates.

An exclusive interview with one of the officials of Federal Fire Service revealed that most filling stations obtain this certificate illegally and that the controller is licensed to revoke such certificates. This affirmed a statement from one of the station managers that, certifications are done prior to regulators inspection. In the real sense, Filling stations must be monitored and inspected to ensure that all requirements are in place before certification.

Consequently, the method of obtaining certification shows that cost of compliance is a major constraining factor to EMP implementation by filling stations. This is in line with the work of Femiye, Kuttu and Anarfo 2013 which revealed that implementation cost is a major factor that hinders the implementation of EMP in Ghanaian firms. Also, during the process of certification uncertainty in the institutional environment, such as the behavior of environmental regulatory agencies could prevent filling stations from seeking certification after implementation. For example, regulatory violations by an EMP applicant station might be revealed or disclosed during its environmental certification process and if such violations are used by regulatory agencies or other third parties against the applicant filling station, then such legal proceedings would result in additional cost of certification to the applicant station and therefore affect the process of EMP implementation.

5. 6. Solutions to the constraint affecting the implementation of the EMP.

In order to attain a higher level of reducing the constraining factors to EMP implementation in Kaduna, it is crucial to identify and apply approaches susceptible to reducing the implementation and maintenance cost and follow-up process.

By introducing compliance dependent compliance monitoring and enforcement, filling station previously complying might be monitored less frequently (Harrington, 1988). They can also be fined less if found non-compliant than firms previously violating legislation. The threat of being placed in the "more frequently monitored" and "more severely punished" group serves as an incentive to comply. Empirical examples of targeting filling station with a greater risk of non-compliance and using higher penalties for repeat-offenders were found in the US EPA's enforcement approach.

The introduction of self-monitoring and self-reporting schemes as a complement to state monitoring has been considered as a possible means of substituting government compliance monitoring efforts by passing some of the monitoring responsibility and cost on to the firm without decreasing deterrence (Cohen, 1999). It is obvious that this may help save administrative enforcement costs to the extent that the firm's self-monitoring and reports replace monitoring activity and detection by the government. This approach also assumes that related cost reductions would not be over-compensated by costs for processing the reports and by the potentially increased frequency of imposition of fines.

As an additional incentive for firms to report correctly, it has been suggested that a combination of self-reporting schemes with differential penalties be implemented. The idea is to impose lower penalties on correctly reported violations or pollution than on violations that have gone unreported and that have been detected by the authority (Cohen, 1991). In reality,

environmental legislation (for example in the EU) frequently requires the regulated agents to install monitoring equipment, to report emissions and to report violations of the regulations (e.g. in cases of malfunction of abatement equipment). Furthermore, the US EPA Audit Policy is an example where positive incentives are granted for self-monitoring and correctly self-reported non-compliance. The quality of monitoring data delivered by operators and regulated processes may also be furthered by monitoring certification schemes as used in the UK. In non-OECD countries, enterprises frequently lack the necessary monitoring equipment and self-monitoring is hence much less developed (Global Forum on Sustainable Development 2004).

6. CONCLUSION AND RECOMMENDATION

This study indicates that, the major constraining factors to EMP implementation in filling station in Kaduna are Ignorance, Cost of implementation and maintenance, follow-up process, lack record keeping, training and Enlightenment programmes, and uncertainty with the regulatory bodies.

It is important for the respective regulatory agencies to devise a way of reducing the cost as well as the paper work involved. In the order to reduce the cost associated with EMP implementation, it would be important for the agencies responsible to encourage environmental management benchmarking to allow similar sectors to collaborate in developing EMP. In addition to benchmarking strategy, it would be important for the regulatory body to encourage EMP implementation by involving some of their officers to assist in filling stations to implement the plan or during the review after implementation. The combination of self-reporting schemes with differential penalties be implemented. The idea is to impose lower penalties on correctly reported violations or pollution than on violations that have gone unreported and that have been detected by the authority,

Also, regulatory agencies should support research organizations, institutions of higher learning and other private bodies in setting up awareness raising and training programmes for the need for EMP implementation on environmental management.

References

- [1] Afolabi, O. T., Olajide F. O., & Omotayo, S. K. (2011). Assessment of Safety Practices in Filling Stations in Ile-Ife, South Western Nigeria. *Journal of Community Medicine And Primary Health Care*, 23: 1-2.
- [2] Bello, O. S. and Inobeme, S. (2015). The Effects of Oil Spillage on the Properties of Soil and Environment around the Marketing Outlets of some Petroleum Marketing Companies in Calabar, Cross River State, Nigeria. *Mayfair Journals*, 1(1): 1-14.
- [3] Cohen, M. A. (1999). Monitoring and enforcement of environmental policy, in H. Folmer and Tietenberg, T. (eds.), *The International Yearbook of Environmental and Resource Economics 1999/2000. A Survey of Current Issues*, Edward Elgar, Cheltenham/UK, Northampton/MA/USA.

- [4] E.F.O.A. (1999). European Fuel Oxygenates Association: Guidance for the Design APEA/IP. www.foa.org. 5-9.
- [5] Emilsson, S. and Hjelm, O. (2002). Implementation of Standardised Environmental Management Systems in Swedish Local Authorities: Reasons, expectations and outcomes. *Environmental Science Policy*, 5: 443-448.
- [6] Famiyeh, S., Kuttu, S. & Bugri, A. E. (2014). Challenges of Environmental Management Systems Implementation in Ghanaian Firms, *Journal of Sustainable Development*, 7(1).
- [7] GFSD, (2004). *Conference on Economic Aspects of Environmental Compliance Assurance*. Global Forum on Sustainable Development: Paris, France
- [8] Genovese, P. (2004). Full-Service Gas Stations. In Lurie M.N. *Mappen Marc*. Encyclopedia of New Jersey. Piscataway. New Jersey: Rutgers University Press.
- [9] Goodchild, E. (1998). *The Business Benefits of EMS Approaches*, PhD, Salford University, Salford.
- [10] Harrington, W. (1988) Enforcement Leverage when Penalties are Restricted, *Journal of Public Economics*, 37: 29-53.
- [11] Lock, M. (1968). *Kaduna, 1917, 1967, 2017: A Survey and Plan of the Capital Territory For The Government of Northern Nigeria*. Praeger.
- [12] Nawrocka, D. and T. Parker, (2009). Finding the connection: Environmental management systems and environmental performance. *Cleaner Production*, 17: 601-607.
- [13] Morales I.M., Miñarro M.D., Ferradas E.G., Caracena A.B. and Rico J.B. (2010). Assessing the impact of petrol stations on their immediate surroundings. *Journal of Environmental Management*, 91: 2754-2764.
- [14] Mshelia, A.M., John, A., Emmanuel, D.D. 2015. Environmental Effects of Petrol Stations at Close Proximities to Residential Buildings in Maiduguri and Jere, Borno State, Nigeria. *IOSR Journal of Humanities and Social Science*, 20: 1-8.
- [15] Poole, M., Coombs, J., & Van Gool, K. (1999). *The Environmental Needs of the Micro company Sector and the Development of a tool to meet those Needs*. Payback Business Environmental Association for the Southwest, Plymouth.
- [16] Prepra Nig Ltd (2015). Environmental Monitoring Plan for Larrabee Enterprises Ltd. A Report Submitted To National Environmental Standards And Regulations Enforcement Agency (Nesrea).
- [17] Walker, B., Redmond, J. and Goeft, U. (2007). *Bellevue Sustainable Industry Project*. Final Report to the Swan Catchment Council, August 2007.
- [18] Williamson, O. E. (1996). *The Mechanisms of Governance*. New York, Oxford: Oxford University Press.

(Received 30 September 2016; accepted 15 October 2016)