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Environmental Impact Assessment and Siting of Filling Stations: Systematic Procedure in the Wa Municipality of Northern Ghana

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Abstract:
The application of appropriate Environmental Impact Assessment (EIA) procedure on the various environmental categories is imperative for realizing quality and sustainable environment at all levels. This can be achieved through effective collaboration among the key actors or stakeholders and clear delineation of roles and responsibilities assigned to the respective players who are mandated to ensure the realization of this course. This study examines the application of EIA procedure on siting filling stations in Wa Municipal. The study engaged a mixed method design and used mainly interviews, observation and questionnaire in the collection of data. In findings; the research has established that there is no collective agreement among environmental institutions on the EIA procedure for filling stations projects. There is also low collaboration among these institutions especially at the technical committee level. The environmental institutions are confronted with a number of challenges in applying the EIA procedure on siting of filling stations in the Wa Municipality. Almost the entire municipality has not been zoned due to the expensive nature of schemes. Developers do fail to comply with the few schemes in suburbs that have them yet it has always been difficult to apply sanctions in the midst of political and socio-cultural interference. Key recommendations include: filling stations projects should be included in category A of environmental categories on which EIA are conducted considering the volatile nature and consequences on the environmental components, key environmental actors should strengthen the forms of collaboration to ensure effective application of the EIA procedure in filling stations construction

Key words: EIA, Filling Stations, Environmental Agencies, Wa Municipality

Introduction

In recent, there has been a gradual introduction of environmental legislation, in an attempt to regulate impacts on the environment (Campion & Essel, 2013). Much of these regulations are concerned with determining compliance levels for pollution emissions. In addition, other environmental management tools have been developed; these include Environmental Auditing (EA), Environmental Reporting (ER), Life-Cycle Assessment (LCA), Risk Assessment (RA) and Environmental Impact Assessment (EIA) (Glasson & Chadwick, 1999). EIA has become an extensively used legal environmental tool for identifying the likely potential environmental impacts of proposed development projects (Wood, 2003; Glasson et

al., 1999). It came into being in the late 1960s, at the same time when the National Environmental Policy Act (NEPA) came into force in the United States of America (Economic Commission for Africa, 2005). NEPA is the first constituted body that gave legal backing to EIA of projects (Hamdan, 2010). This environmentally sensitive tool has since been exported and adopted by other countries worldwide: Australia in1974, Thailand in1975, France in1976, Philippines in 1978, Israel in 1981, Pakistan in 1983, (Hamdan, 2010). According to Wood (2003), EIA has gain wide acceptance in more than 100 countries world-wide. In Morgan (2012) it is estimated that from the inception of EIA from NEPA till date, its practice has been mandated in 191 of the 193 countries of the world which provided enough grounds to conclude that the EIA has gain worldwide acceptability as a tool for effective environmental decisions. Many African countries accepted and incorporated EIA in their environmental policies and legal requirements for proposed development activities in the 1980s. Algeria, Burkina Faso, Gabon, Gambia, Mauritius, Nigeria, Senegal, Togo, Zambia and others have included EIA provisions in one form or another within their frameworks of environmental legislations. In Egypt, Ghana, South Africa, Zambia, Senegal, Côte d'Ivoire and Togo EIA requirements have been introduced in framework legislation, which is implemented through specific regulations and guidelines (Bekhechi, & Mercier, 2002). In Africa many countries had been dominated by environmental crises especially after post independence owing to; mounting pressures from rapidly-growing populations, unrestrained urbanization and expanding agricultural and industrial activities (Kidane-Mariam, 2003). In their pursuit for accelerated economic growth, several national development agenda and foreign direct investment projects did not take into consideration the repercussions of such projects on the natural environmental resources. The result had been the considerable harm to the physical and human environments in forms such as; natural disasters, droughts, bush fires and famine that continued to wreak havoc on the continent without an appropriate check system in place (Campion and Essel, 2013). With the expected potential benefits of EIA, and in view of the numerous social, economic and environmental problems the continent faces, EIA systems are practiced in almost all African countries. These systems are however, anchored on EIA experiences and practices in the more developed countries (Campion and Essel, 2013). Ghana adopted an enabling EIA Legislation in 1994, and EIA has since become important in proposed development projects in the country (Appiah-Opoku, 1997). Dating back to 1985, the Ghana Investment Code (GIC) required the Ghana Investment Centre which has now been modified as Ghana Investment Promotion Centre (GIPC) to integrate environmental concerns in its activities. Other legislations with EIA requirements include the Energy Commission's Act (ECA) of 1997 and the Water Resources Commission Act (WRCA) of 1999. Increasingly, investments and resource promoters and regulatory bodies such as the Town and Country Planning Department (TCPD), Minerals Commission (MC), Forestry Commission (FC), Ghana Wildlife Department (GWLD) relies extensively on EIA as an aid to planning and making environmental decision. Development permits are granted only after an environmental permit is obtained from the Environmental Protection Agency (EPA) (Economic Commission for, 2005). According to (Campion & Essel, 2013) there are different categories of environmental projects requiring varied EIA procedures. (Li, 2008) asserted that the kinds of projects covered by EIA keep broadening; generally, an EIA has

been applied to undertakings defined as key projects based on the level of investment, type of activity, scale of activity, land area covered, potential environmental impacts, or a combination of these factors.

The EIA procedure for Ghana as provided by EPA (1994) which guides in making environmental decisions was a yardstick for determining the procedure applicable in arriving at decisions regarding the siting of filling stations projects in Wa Municipal in this research. The extent to which environmental agencies and other stakeholders such as the public are engaged in the process of filling stations projects are germane concerns and were examined in the EIA structure. The level of collaboration that existed among stakeholders in projects development is a relevant expected outcome in this research. The momentum and scale of the urban transformation particularly of the developing world presents alarming challenges (Cohen, 2006). Of much concerns are the risks to the immediate surroundings of the environment, available natural resources, the health conditions of living things, social and organizational structures and to the right of individual (Cohen, 2006). In recent times, urban growth has outpaced the ability of governments in many developing countries to provide essential infrastructure, pass and enforce the needed legislation to ensure protected, worthwhile and healthy lives in cities (Afolabi et al., 2013; Khahro et al., 2014). The growth has come with increased use of automobiles needing fuelling services which has culminated to proliferation of petrol filling stations (Khahro et al., 2014). According to (Sartorius, et al., 2007), the demand for petrol is strongly influenced by local geographical and demographic factors such as; number of cars, proximity to airport, downtown, highways, population and average income. Despite the fact that petroleum products are indispensable part of a modern technological society, they also pose numerous risk and threats to the environment. Particularly, where negligence to the standard requirements for petrol filling stations building occur, the health of workers and masses residing close to the petrol filling stations are threatened and the air, soil water and other environmental components are endangered (Ahmed et al., 2014; Nieminen, 2005). In Wa municipality, one contributory factor that accounts for the hike in filling stations is the mass importation of motorbikes and cars. Within the period, 2007 to 2014, there had been an increase flow of cars and motorbikes into the region where a great proportion is retained in the municipality as the chief means of transport. All of them are either powered by petrol or diesel. For instance, in 2007, registered total number of cars and motorbikes were 57 and 3066 respectively. In 2014, the numbers soared up to 209 and 9399 respectively (DVLA 2014). Again in 2007, total number of functional registered filling stations within the municipality was 6. It stands today that, the number has increased to about 17 filling stations with a number of them still under construction (Wa Municipal Assembly, 2014). Even though this creates employment opportunities, siting of fuel filling stations in residential areas is becoming fashionable in the Municipality. In most instances, the distance between filling stations and the Nearest Neighbor is too close. It has also been realized that many filling stations are located too closed to one another. Although EPA has not spelled out specific buffer zone between filling stations and residential structures, the TCPD which collaborates with EPA in determining the zoning requirements for filling stations, with reference to the Ghana National Building Regulatory Act (CAP 85), required that 50ft (15.4) buffer should be created between filling stations and the next

adjoining neighbor in the Wa Municipality. The problem of this research is the contentious way in which filling stations are been sited within residential areas and public places which can constitute some risk to environmental components such as human beings and their property, flora and fauna and atmospheric air. The study therefore seeks to determine what EIA procedure is applied on the sitting of filling stations in Wa Municipal.

Methodology

The study adopted mixed method design that focuses on providing numerical measurement of variables as typified in quantitative approach and as well seeking to obtain information on people's experience, opinions and knowledge as in qualitative research, a mixed method research was deemed appropriate for engaging the strengths of both quantitative and qualitative methods (Creswell, 2009). Qualitative data was sourced through face-to-face interviews with environmental agencies and filling stations managers through the engagement of semi structured interviews, key informant interviews and observations to obtain in-depth findings. Quantitative data was obtained from people who live and operate within 15.4m around filling stations. The Town Country Planning Department (TCPD) Building Regulations requires that fillings stations should be situated at a minimum of 15.4 meters away from any major adjoining structure or neighbor such as; residents or major roads. Based on this regulation, sampled residents and business owners within this radius were interviewed through the use of questionnaire to obtain desired responses. Semi structured interview guide was used to conduct face-to-face interviews with key informants to obtain essential data for analysis. Observation was also employed in obtaining data from the fillings stations alongside interview. A checklist of basic requirements at filling stations was used. Things observed included fire extinguishers, smoking signs, availability of canopy, presence of hydrants, proximity of residential buildings and businesses. This was to enable the determination of the extent to which nearest neighbors are exposed to risk around filling stations, and whether managers adhere to mitigative measures or compliance standards at these stations as embedded in the generic EIA procedure of Ghana. Quantitative data was obtained through questionnaires. This was administered to people or residents around filling stations who qualify as nearest neighbors by EPA definitions; people who live or operate within 15.4m radius around filling stations as required by TCPD. Secondary data such as maps, plans/schemes, baseline information on filling stations projects, environmental policies documents and development plans and other studies were collected from Government and Development Agencies/ Institutions' records as well as from the internet. Secondary data from EPA included evidence of registered filling stations, procedure for siting filling stations, EIA screening report forms. At the Municipal Assembly, register of filling stations was sourced. At Ghana National Fire Service (GNFS), secondary data obtained included, evidence of registered and certified filling stations and permit acquisition procedures. At the TCPD zoning polices and schemes were obtained and studied. Filling stations managers/ directors provided evidence of permit documents, fire certificates and site plans. Mathematical method was found suitable for determining the sample size for this research. Since there had not been an existing sample frame for people residing near filling stations in the Wa Municipality, it became one of the fundamental requirements to be able to conduct this research and it was possible to determine this through the following procedure. First,

with reference to the National Building Regulatory Act (CAP 85), TCPD required that a 15.4m buffer be provided from the fence walls of filling stations to the next adjoining building or structure. Secondly, though EPA has not got a specified requirement (measurement) for this, they used the Nearest Neighbor's concept which emphasized that there must always be a nearest adjoining neighbor to a filling station who should matter in the establishment of the station. With these 2 guiding principles, the following steps were taken to determine the sample frame for the study.

1. 100ft (about 30.8m) long tape measure.
2. A predetermine 50ft distance beginning from the end wall of the house considering the outer wall to be the fence wall of the filling station.
3. On the field, with the support of a field assistant, distances were measured from the corners of the Filling Station walls one after another. Within the catchment, all buildings or structures were captured and numbered.
4. Those filling stations on the fringes that did not have houses, stores and other structures around them within the 50ft buffer, the nearest adjoining neighbor concept was applied to obtain and included in the sample.
5. Finally, the exercise produced a sample frame of 371 people.
6. The sample size was then determined using the Yemane (1967) method as calculated below:

$$n = \frac{N}{1 + N(\alpha)^2}$$

Where:
n - Desired sample size
α - Stands for the margin of errors (0.05)
1- is constant
N- Total population (371) of residents around Filling stations
Therefore, by substituting the values above,

$$n = \frac{371}{1 + 371(0.05)^2}$$

n = 192.45 people

The sample size for the quantitative data was 192 people
In addition, 5 environmental institutional heads and 13 managers of filling stations were interviewed. Though there are 17 filling stations in the Municipality, 13 managers were interviewed. This was because some managers have oversight responsibility over two or more filling stations within the Municipality.

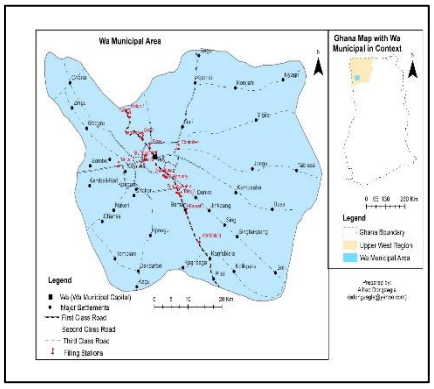
Purposive sampling was used to select heads of decentralized institutions that have the mandate partly or whole in ensuring some amount of environmental quality. The Departments and agencies included: Environmental Protection Agency, the Municipal Assembly, Town and Country Planning Department, the Lands Commission and the Ghana National Fire Service. There are currently 17 operational filling stations within the municipality. This is evident as collected field data correspond with documents from statutory agencies such as the EPA and MA. All filling stations were selected purposively

whereby the Directors/ Managers were interviewed. Informed consent was sought from respondents before taking voice recordings of information from the Institutional Heads and filling station managers and for those who were not comfortable to have their voices recorded, data was hand written into a field note book. This is in conformity with Leedy and Ormrod, (2001) assertion that research participants are entitled to adequate knowledge of the study and should be informed of the nature of the study to be conducted to influence the decision of participating or not participating, and if even they decide to participate they have the right to pull out at any time. The qualitative data was transcribed, familiarized and summarized into categories, sub-categories and themes both manually and with the aid of *Nvivo 10 for windows*. The Nvivo software was used to code (note) qualitative data into themes. The coded data was then printed, analyze manually and presented in the form of text and plates. Quantitative data was analyzed by the use of SPSS version 20.

Profile of Study Area

Wa Municipal is situated at the southern part of the Upper West Region of Ghana. It is bounded to the North by Nadowli East District and to the East and to the West by Wa West and to the South by Wa East and West District. It is located between Latitude $1^0$40N to $2^0$45S and Longitude $9^0$32W to $10^0$20W. It has total land mark area of approximately 234m^2 (Wa Municipal Assembly, 2014). The Municipality is located in the savanna height between 160m and 300m above sea level. It located within the guinea savanna grass land with the commonest economic trees being: shea tree, Dawadawa, Kapok, Nim, Cashew, Mango and Baobab. The vegetation is affected by anthropogenic activities including: charcoal burning, construction, and farm activities. The total Wa population of the Municipal is approximately 145,065 according to the 2010 population and housing census (GSS, 2010) making up of multi varied ethnic groups and languages. It is said to have about 95% of the people belonging to the Mole Dagbani lineage. The different ethnic groups in the area include the Wala, Dagaaba, Sisala, Lobis and other minor groups from the southern part of Ghana. Agriculture is the dominant activity in the municipality representing about 70% to 80% of the population and closely followed by petty trades and industry. Transportation, tourism, and non-formal sector activities are also carried out in the municipality. The figure below is a pictorial representation of the Wa Municipality as the study area where the researcher seeks to understand the application of the EIA procedure on the siting of filling stations.

Figure 1: Map of Study Area



Data Presentation and Analysis

Agencies Perspectives on the EIA Procedure for Filling Stations Projects

To determine the EIA procedure for filling stations projects, key environmental agencies/institutions were interviewed pertaining to the procedure available for filling stations development. Views were sought from officials of the TCPD, EPA, MA, GNFS and LC for the purpose of the study. These institutions in one way or the other ensure that EIAs are incorporated in projects development frameworks as a way of checking the quality assurance of components of the environment. This falls in the interest of Agenda 21 which recommends the commencement of suitable procedures for proposed projects which have likely significant impacts upon biodiversity where appropriate as contained in Ogola (2007). All these institutions (100% response) confirmed to have generally ensured that developers incorporate EIA in developmental projects particularly those requiring any form of EIA (Category A and B projects in this respect). However, in the context of filling stations development there seem to be a controversy among the key environmental institutions or agencies regarding the exact EIA procedure required for filling stations project development though all institutions described it as a volatile project. Comparatively, out of the 5 institutions interviewed in respect of the subject matter, 4 institutional heads representing 80% were of the view that filling station projects should go beyond screening to include scoping. This implies that filling station projects do not undergo full EIA though they are regarded as flammable and most likely to pose adverse effects to other environmental components. It further suggests that there is no collectively agreed EIA procedure for filling stations projects development though these key environmental agencies collaborate in fillings station projects establishment in their line of work. EPA proclaimed that filling station projects are small scale activities classified under Category B environmental projects. According to the EPA, projects within this category are those environmental projects that do not go through the entire EIA procedure but only end at the Screening stage. This confirms Campion & Essel (2013) assertion that Category B projects require some environmental analysis and is assigned to projects whose impacts are less significant and not as sensitive, plenty, or diverse. Encouragingly, EPA emphasized that it is only filling stations that intend to locate in Critical Zones such as forestry areas that may go through the entire EIA process though EPA does not allow such development in the first place. This finding also confirmed

the notion by FAO (2011), that Category B projects to which filling stations belong, have less significant adverse impacts and may be easily prevented or mitigated and therefore require environmental analysis to identify more precise potential negative impacts.

EIA Procedure for Filling Stations Projects: Managers' Perspectives

From the FS managers' perspectives regarding the EIA procedure for filling station projects, it became clear that the construction of a filling station project does not practically take full EIA. FS developers are only required to apply and fulfill some environmental examination requirements, meet some basic accepted standards required by respective environmental institutions, then permits are issued for project commencement. This requires meeting the National Petroleum Authority's (NPA) requirements for the grand and issue of permits to construct a petroleum product retail outlet which in this case refers to filling stations as outlined in the NPA Act, 2005, Act 691 section 30; Contacting the EPA for project assessments and issuance of environmental permit, the assessment by the Ghana National Fire Service (GNFS), verification of the proposed site for the project by the Land Commission (LC). All the thirteen (13) Managers interviewed confirmed the incorporation of EIA procedures in FS establishment considering such projects as volatile. However, the research has revealed that of all the functional filling stations within the Wa Municipality, 18% did not go through the procedure described particularly at the time of establishment because they were established before the enactment of EIA regulations in Ghana. Aside these, the Managers of the remaining 82% filling stations established after the institution of EIA for environmental governance confirmed to have duly gone through this procedure. Among the various institutions, the Municipal Assembly only gives permit to intending developers as part of the procedures after duly assessing the permits given by the other agencies to grants their commencement. With the exception of the LC, the rest of the institutions have the mandate of issuing permits to filling stations developers before commencement of the project and are aware that FS developers must obtain permits to carry out the project. Aside, the procedure above implies that there exist different forms of collaboration among Environmental Institutions/Agencies which is a necessary ingredient to environmental streamlining. It goes to confirm Faure (2011) view that governmental agencies that are entrusted with environmental decisions making powers are plenty and varied in terms of the nature of the project and activities inherent in undertaking the project. However, the findings disagrees with Faure (2011) assertion that projects at National and Federal levels are assessed by EPA while at the regional levels governmental environmental departments exercise similar authorization regarding the activities of the project. This is because the decentralized nature of EPA now makes it functional and accessible at the regional and even district levels as at the national or federal levels.

It has also been found as part of the EIA procedures that the TCPD regulates commercial and industrial land uses, provides appropriate advisory services to EPA on the area designated for the purpose. This agrees with the NPA Act, 2005 Act 691 which states that the TCPD is the statutory agency that determines the zoning status of an area. In addition, it also fulfills the role of the TCPD as spelled out in the Local Government Instrument 2009, an amendment of LI 1961.

Stakeholder Collaboration in Filling stations Establishment

As part of project designing and implementation which also include filling stations, the collaboration of stakeholders/institutions are key as supported by Faure (2011). This aspect tries to look at the levels of collaboration among the key stakeholders' (EPA, GNFS, LC, MA and TCPD) pair the EIA procedures in filling stations establishment in the Wa Municipality. However, using the scale of Low to High, findings gathered regarding the level of participation among the various environmental agencies/institutions overall has been in different levels though all these institutions are key in the decision-making regarding the EIA procedure. They are involved in the vetting of application forms prior to FS development. Regardless of the above, in general the collaboration among these institutions according to them has been Low in scale. It is only the collaboration between the EPA and the GNFS that has been ranged as Average in scale. The two institutions according to them interact routinely as far as the EIA procedure in filling stations establishment is concerned. Pair their collaboration, the TCPD advises the EPA about the suitability of the land to be used for the establishment and as well draws the site plan for the developer upon confirming the suitability of the land to be used. The level of collaboration between the TCPD and EPA according to them is Low. This is consistent with Faure (2011) assertion that there are different levels at which the power to assess projects are distributed. What this means is that as collaboration among the statutory agencies in ensuring quality environment is compromised, filling stations are sited at busy intersections and along heavily populated parts of the Municipality. Reasons attributed to both the industry and the government agencies as supported by Williams (1969). Bad planning or no planning has allowed the concentrations of stations among populated settlements without adequate control (Williams (1969).

Quite apart from the low collaboration levels among the environmental institutions, the level of collaboration between filling station developers and Nearest Neighbors is worse of all. Consulting the minimum of 3 and the maximum of 5 Nearest Neighbors and above pair the EPA's seems not to exist, because the act is made too flexible. For instance, In-depth interviews held with environmental institutional heads reveals that intending FS developers either select persons they know and consult who are less subjected to rejecting the decision, with little or no consultation with the rest of other persons living around the same environment in the course of developing and operating the filling stations though all settlers stand to bear the brunt of the likely impacts. This finding contravenes EPA's postulation that pair their location requirement, a minimum of 3 and maximum of 5 and above persons are consulted for their approval and endorsement of the project application forms in authentication of the project development. The reason had been that Nearest Neighbors stand to benefit from the externalities of such projects; as such their approval is crucial so that emerging conflicts between project developers and community members are avoided to ensure projects sustainable. This also conflict the NPA Act, 2005, Act 691 which rather recommends that a public hearing be conducted where necessary and not the consultation of individuals. What this means is that in the event that individuals are consulted the developer could choose to pick only those who support his decision or better still the developer could

pay off some interested parties to have his way through. Fulfilling the standards for both EPA and NPA regarding participation or consultation has been found not satisfactory in this research as the phenomenon is very low and even where it is said to have been carried out, it was done informally; at homes or at work places. It stands to confirm the view of Bass et al. (1995) in describing the EIA process as generally non participatory, rigid and mechanistic. Generally low stakeholder consultation and collaboration also implies that the benefits associated with it as outlined by the World Bank Environment Department (WBED) (1999) cannot be derived by both the stakeholder as well as the developer. For example, stakeholder consultation which has the potential of reducing conflicts and delays in the project development which can be translated into profit for the investor will not be realized as a result of poor or low collaboration. In the same vein, the potential of effective stakeholder consultation or participation to ensure that vulnerable groups receive attention by which equity is considered and the needs of the poor given priority has also be denied (WBED, 1999). The specification by Agenda 21 requiring the commencement of suitable EIA procedures for proposed projects especially those which have likely significant impacts upon biodiversity, ensuring wide public participation, where appropriate, and promote the assessment of impacts of relevant policies and programs on biological diversity has not been given a proper place in the context of the EIA procedure for siting filling stations in the Municipality.

EIA Procedure for Filling Stations Projects Establishment

As part of the procedural requirements in FS establishment, public hearing is mandatory and a prerequisite for the issuance of permits as stipulated by the NPA Act, 2005, Act 691, which states that under necessary circumstances, the EPA should consult the neighbors of a particular area to seek their views about the proposed fillings station project before the grant and issue of EPA permits. It added that such should be carried out in the form of public hearing. In the course of the study, some Nearest Adjoining Neighbors of FS were interviewed to ascertain the level to which they have been involved in the establishment of the filling stations around them. Out of the 192 Nearest Neighbors interviewed only 9 respondents representing (4.7%) disclosed that they were consulted in the process. The form of consultation according to them was only on individual bases. This falls short of the community participation in the form of Public Hearing (PH) as specified by the NPA. Many clear reasons accounts for the low level of involvement of the public (Nearest Adjoining Neighbors) in FS project establishment as revealed by the survey. Firstly, some of the filling stations were established before the birth of LI 1652 and the EPA Act 1994, Act 490 for which reason EIA considerations were not embedded in the FS constructional requirements. Secondly, some filling stations were constructed long before residential and business structures were developed around them. In otherwise, these FS are older than all other structures sited around them; so in essence, development has caught up with filling stations. Under such a circumstance public hearing was compromised. Thirdly majority of the residents (95.4%) interviewed about the subject matter also indicated that they were new generation and could not tell whether their parents were consulted in one way or another prior

to the construction of the FS projects since they are dead and gone. Fourthly, some Nearest Neighbors by the newly established filling stations did not see why they should be consulted by FS developers in the project establishment though they revealed excessive smell of fuel during discharge among others as the immediate adverse effect of FS establishment.

Though a higher number of Nearest Neighbors (95.5%) stressed on the adverse effects of filling stations projects establishment on environmental components, (4.5%) of the Nearest Neighbors confirmed its helpful nature. filling stations projects establishment normally act as poles through which available social amenities are improved upon or provided at their vicinities. According to them, it is through the establishment of a fuel station by their neighborhood that they had electricity and water. Basing on the important roles filling stations plays in their localities as indicated above, Nearest Neighbors do not see the reason why they should be consulted. This can related to Hughes (1998) proclamation that low level of education can be a barrier to effective participation in EIA.

Safety Measures at Filling Stations

Safety standards or mitigation measures at filling stations have been identified as one indispensable requirement that FS developers are mandated to meet; owing to the fact that filling stations are vulnerable to explosion if not properly monitored. Besides, it is also a relevant component of the EPA procedure for projects development. The basis of instilling mitigation measures has been supported by Hussein (2013) who stated that the objective of ensuring environmental safety elements to work at project sites focuses on minimizing human injury, loss of lives, loss of property and property damage and the economic and social dislocation caused by natural and human made hazards. This has been backed further by Phoya (2012), in his thinking; safety practices at filling stations should not be the responsibility of only the service provider but both the service provider and the consumer. However, interviews held with the key environmental agencies in the Wa Municipality revealed that there are general and specific safety checks that FS developers are supposed to put in place. These mitigations are left to the checks of statutory bodies such as the EPA, TCPD and GNFS. According to the environmental institutions, these three (3) institutions are the technical bodies to ensure that FS developers go by the safety measures enacted, but not all the institutions involved. Therefore, it is not in the domain of Land Commission, and Municipal Assembly to ensure mitigation checks at FS.

However, the following mitigation measures were outlined by the Environmental Institutions which FS developers are mandated to put in place to reduce or eliminate any likely impacts on the environment and they range from fire, health, waste management/control to General safety measures.

1. **Fire and health safety measures which comprises the following:**
    - The installation of fire extinguishers at FS
    - Provision of fire alarms.
    - The provision of smoke detectors and non-smoking signs
    - Provision of hydrants/ readily available source of water
    - Trained fire-fighting attendants.
    - Provision of fire management plan

- The provision of sand backs for controlling fire in terms of outbreak.
- Creation of emergency assembling point

2. **Waste management/control measures**
    - The provision of washrooms
    - Daily cleaning around filling stations
    - Provision of dust bins
3. **General safety measures**
    - Provision of ingress and egress
    - Provision of canopy to protect attendants and fuel from direct sun radiation
    - Wearing protected cloths and boot to prevent direct contact with fuel
    - Daily checks on leakages
    - Distant from residential areas
    - Distant from public institutions such as schools, banks, clinics.
    - Plots size
    - Distance between filling stations and main roads
    - Distance between Filling stations and public source of water such as dams.

To ascertain the presence or absence of these safety measures enumerated by the Environmental Institutions, the study used an observation checklist to measure whether the existing filling stations operators really comply with these measures. Besides, the essence of this was to observe the extent to which risk is reduced or minimized through the installation of the aforementioned safety standards. From the data gathered, not all the filling stations in the Wa Municipality complied with these EIA procedural safety measure for filling stations establishment. Though it is widely endorsed that filling stations are prone to explosion, all the filling stations established has no hydrants through which the GNFS can rely on to fight excessive fire outbreak. Also, all the filling stations have failed to comply with the 50 ft. distance to the main road pair the EPA guideline towards safety. Besides, 35.5% of the fuels stations do not have sand buckets which are regarded as first aid to fight mild fire outbreaks.

The Perspectives of Environmental Agencies Regarding FS Developers Compliance, Non-Compliance and Sanctions

Quite apart from the statistics presented above regarding the compliance and non-compliance generated by the use of the observation checklist, views sought from the Environmental Agencies also revealed that filling stations do not comply with all the safety measures pair the EIA procedures for FS establishment. Notwithstanding the above, findings gathered from the environmental institutions regarding the available sanctions to FS operators for non-compliance vary from institution to institution. According to EPA, failure to implement mitigations measures may call for sanctions which may include; suspension of operation permits or cancellation of permit. Nonetheless, this only happens when victims refuse to adhere to previous written warnings. Also failure to renew permits timely attracts extra charges at the time of renewal. However, the response obtained from the MA respondent indicated that he never witness the Assemble taking any FS manager to court especially in

terms of non-compliance but added that "*we only wait until the disaster strikes then we begin to portion blames"*. He concluded that the assembly wields so much power but unable to enforce them due to external interference.

From inference, the onus lies within EPA to ensure that non-compliance to safety standards by filling stations operators be given the appropriate sanctions as supported by the EPA Act, 1994 Act 490. On the other hand, the response from MA also confirms that it is the function of the EPA, TCPD and the GNFS to ensure that FS developers comply with safety standards pair the EIA procedure for filling stations establishment.

The Likely Impacts of Filling Stations Establishment and Operations

This aspect of the study dwells on the impact of FS on environmental components which includes human health and property, water, air, settlements, business, flora and fauna. The section has also been built around the Risk Theory**.** Different risk theories have been espoused by Phoya (2012).The Psychological Theory argues that the way risks are assessed, judged and communicated depend greatly on how an individual involved in the process perceives risk. Risk perception studies have identified qualities of risk that influence risk judgment and decisions (Phoya, 2012). These include knowledge about the risk- the extent to which the risk is known and personal control of the risk- the degree to which personal qualities and skills can be used to protect the individual.

The Socio-Cultural Risk approach explores how meanings of risks are constructed within social groups and how a person understanding and perceptions of risk are fashioned by social factors and experiences. The main argument of this approach is that risk assessment, judgment and communication are not formed independently from the social context. They are part of an evolving social debate about Fillings, knowledge, power relations, past experiences and the culture of the society (Phoya, 2012).

All the 5 environmental institutions attested to the fact that filling stations are risky projects and have impacts on environmental components around them. People reside and operate around filling stations either permanently or temporally, residents or business operators. This can be zoomed into Alldred and Shrader-Frechette (2009) position that the greater the distance of a risky facility the less likely are the risk and nearer the distance of the risk point the more likely are the risk. Since the construction of FS involves altering the natural state of a portion of the environment into a desired project design, in many cases the land is cleared, the natural habitat is disturbed and vegetative properties are remove. The nature and composition of petrol gives it a unique smell which has the capacity of altering the natural quality of atmospheric air particularly within its location. Data gathered from the environmental institutions, the Managers of filling stations and the Nearest Neighbors revealed all the following impacts which were collated and categorized under respective environmental components as follow. These have been supported with quantitative data collected from Nearest Neighbors in respect of the same components.

Human Being/Health

Though petrol is good, if the petrol station happens to catch fire, people, buildings, containers, stores and other commercial businesses will be affected. This means that people are at risk of fire for living around FS. Fuel attendants are exposed to skin infections particularly when fuel pours directly on their skin. Some people are allergic to the smell of petrol when inhaled. For other people, the smell of petrol causes them to nauseate or vomit. But what is more serious is that we do not know the cumulative impact of inhaled petrol or diesel in the long term as people continue to live and work around FS. Filling stations generate lot of waste which constitutes environmental pollution, a hazard to human health. Vehicles produce so much noise and disturb the sleep of residents around FS particularly in the night. What this also means is that neighborhoods of FS are deprived of sound night rest particularly after a hard day's work.

Water

Leakage of petrol from underground tanks if not properly managed may run into streams and rivers particularly those nearer to water bodies. Pollution of water sources can give cumulative impact on those who source such water. This means that the filling stations located nearer water bodies in the Municipality are likely hazards now and in the future. Petrol pollutes air which is why at filling stations the ambient air quality is disturbed. Though the smell produced at filling stations is permissible as admitted by GNFS, in the contrary some respondents are allergic to it. For such people, the smell from petrol causes some people particularly pregnant women to vomit and for others, it causes asthma. Though some of the immediate impacts are known, the cumulative effect cannot be determined.

Settlements

Explosion of fuel can affect houses particularly the nearest settlers and residents. This is why it is mandatory for all established filling stations to install fire extinguishers to reduce the risk of fire in the event that it occurs. Residents around filling station are also at risk of vehicular accidents particularly during fuel shortage.

Plants and animals

The preparation of FS requires clearing of bush and felling of economic trees such as shea and dawadawa which are very common in the Upper West Region and the Wa Municipality for that matter. The natural habitat for other plants and insects are also disturbed. Interviewing a nearest neighbor at a particular filling station it was unearthed that over 15-20 shea trees and an unmentioned number of dawadawa trees which were sources of likelihood for some people were cleared to give way to the filling stations. These findings support the Health and Safety Executive (1997) position that the construction and operation of filling stations imposes adverse effects on environmental components similar to the research findings in this respect. It also supports Terrés, (2010) argument that exposure to the VOC around FS can result in a variety of adverse health effects including asthma, headaches, mucosal symptoms and an increased risk of cancer

Severity of the Identified Impacts of the Establishment of Fuel filling Stations

The focus of this objective was to highlight the different standpoints regarding the severity of impacts of filling stations on the environmental components ranging from the perspectives of the Nearest Neighbors to that of the key environmental institutions in the Wa Municipality. Others include the general associated risk living by filling stations, the relationships between level of education and the understanding of risk, duration of stay by filling stations and knowledge of the associated risk.

Neighbors Views on the Severity of Impacts of Filling Stations

Phoya (2012) emphasized that risks/impacts judgment and communication depends greatly on how the individual involved in the process perceives risk, that perception about the risk/impact is the central focus of risk assessment and communication, that estimating the magnitude of an impact is generally an expression of the relative severity, in terms of major, moderate or low. A scale of Low, Medium and High was used to determine the extent and severity of impacts of FS establishment on the environmental components. Respondents were asked to rank how severe they perceive the establishment of filling stations on Humans/health, Property, animals, vegetation/plants, water among others. From findings gathered as indicated in table 4.5 about NN response to whether it is risky living near a filling station, 92.2% of the respondents agreed that indeed it is risky living and operating near filling stations with 7.8% confirming no risk. Though majority of the respondents confirmed that living near filling stations is risky, further findings from 38.1% of the Nearest Neighbors indicated that this risk is generally **low;** and 22.3% are of the view that living by fuel station is highly risky. Other category representing 28.3% also contended that filling stations have no associated risk adding that one cannot tell the transformable effects of fuel products on their lives and they had never been told of any health complications associated with their stay by filling stations.

Severity of Impacts of Filling Stations Establishment on Environmental Components

In relation to the severity of impacts on the environmental components, each environmental institution shared one or two views ranking it from Low, Medium to High. Of the five (5) environmental institutions interviewed, 3 of them (MA, GNFS, TCPD) disclosed that the probability of filling station impacting on human being is High in the context of risk of fire explosion, spillage contaminating sources of water, the clearing of trees within and the excessive smell it poses particularly during discharge. Besides, 4 of the institutions (LC, MA, GNFS, TCPD) also asserted that the probability of filling stations affecting settlement and property is Medium, for reasons that not all business centres and settlements are insured hence any explosion could lead to displacement. FS impact on human health is higher as more than half of the institutions confirmed it. It is however medium in the case of settlements, structures and property of human beings around FS. The impact on air has been ranked medium but ranked low in the case of water as all five (5) environmental institutions interviewed confirmed this, adding that most of the filling stations within the municipality are located distance away from water sources which represents 17.2%.

Risks of Living by Filling Stations

Aside the risks/impacts of the FS establishment on the environmental components, views were sought from Nearest Neighbors regarding their most perceived risks living by Filling stations. Risk of fire was discovered as their greatest risk representing 46.1%. However, 93 of the Nearest Neighbors (26.2%) disclosed the smell of fuel as their greatest risk living by fuel station; whiles (20.9%) revealed risk of noise. The risk of diseases/sickness however recorded the least representing (6.3%), as most Nearest Neighbor disclosed that they have no idea of the transformable effects on their health in the future.

Levels of Awareness of Risk Living by Filling Stations

Another fundamental consideration was to compare the level of education of Nearest Neighbors of FS with their understanding or perception of risk of living around FS. The level of education was considered from the basic level, secondary/ vocational and tertiary levels respectively. Findings gathered indicate that education has a significant role to play in as far as risk understanding is concerned. All the Nearest Neighbors who had attained tertiary level education confirmed that it is risky living by filling stations, whiles 10 of the Nearest Neighbors with basic levels education are of the view that living by filling stations has no associated risk.

Duration and knowledge on FS Impacts

People's understanding of risk was also measured by the duration they stayed around Fuel Station (FS). In overall, majority have confirmed that the FS environment cannot be a suitable place to live owing to the fact that it is risky. That apart, Nearest Neighbors understanding of the risk vary from their duration of stay. It is revealed from the survey that majority of persons who stayed by Filling stations between the duration of 1-5 years revealed that it is risky living by fuel station. The trend did not change with the rest of the age categories. For instance, out of 192Nearest Neighbors who revealed to have stayed between the duration of 1- 5 years 105 of them affirms that living by fuel station is risky in nature, whiles only 10 within the category think otherwise. The 29Nearest Neighbors who lived by Fuel Station (FS) between 6-10 years all confirmed that it is not safe living near Fuel Station. For those who lived for 10 years and above only 5 out of the 48 interviewees thinks that living near filling stations (FS) has no risk. It implies that the duration of stay around filling stations has little influence on people's understand and experience of risk while residing around FS.

Institutional Challenges in Siting Fuel Filling Stations in the Wa Municipality

Unearthing institutional challenges concerning the application of the EIA procedure for filling stations project is an essential aspect of this research. It is stated in Wood (2011) that statutory agencies/organizations detailed for the implementation of EIA provisions in developing countries are often new, mostly influenced by certain political cloud where want of information sharing significantly reduces their control. In this current study, the following challenges were harnessed as some of the challenges in applying the EIA procedure in FS projects in the Municipality.

The survey reveals a generally low collaboration among environmental institutions in projects development. Some of the institutions especially the GNFS, indicated that their representation in the Technical Committee (TC) has been poor. Reasons given were that in most of the cases they were not informed of the meetings. This consequently impacts poorly on the quality of collaboration needed for effective environmental decision taking regarding filling stations establishment.

Inadequate staff to effectively monitor land base projects. This has been found as general challenge across all institutions but more peculiar to the EPA who is located only in the regional capitals.

All the institutions interviewed expressed a common concern of inadequate Logistics to effectively deliver their function.

The municipality has no schemes for all sections of the town due to high cost of schemes preparation against limited resources of the Assembly.

The few schemes that are even prepared by TCPD do receive the necessary recognition. People do not respect the schemes. Failure to adhere to fire safety rules by filling stations operators and non-recognition of the role of fire stations. What it means is that people do not seek the expertise of GNFS in designing and implementing their projects. Many of those who

do not even stick to the expertise offered them. The only time they need GNFS is when fire disaster strikes. Land lords are contributory factors. The customary land secretariat (CLS) which is supposed to be the regulatory body in terms of land management is not up and doing in their duties. There is poor management of land by these people as reflected in multiple sales of lands. It was expected that with proper collaboration between the Municipal Assembly and CLS and other institutions, land management problems should not have an issue. Most prevalent is the situation where you have landlords doing multiple sales of a piece of land to several clients. Some land lords proceed to sell out lands which were hitherto given out for schools or markets at the blind sight of the Assembly which eventually distorted the scheme and created problems. Finally, some development projects came up before schemes were prepared which might disqualify such projects in respect of their location but which are difficult to relocate or removed.

The Impact of Institutional Challenges on the state of the Environment

The study also sought to establish a relationship between institutional challenges in filling stations establishment and the implication for environmental safety. Data obtained from the institutions revealed the following inferences that sought to explain that indeed challenges confronting environmental institutions bear adversely on the quality of the environment as in the following:

Failure to observe environmental safety measures affects the safety of the environment. For instance, fire extinguishers when expired without immediate replacement increase the risk of fire and the magnitude of impact in the event of fire outbreak.

As filling stations spring up everywhere in the municipality without due consideration of laid down procedures, the future state of the municipality will be characterized by disorganized settlements. Particular reference had been made to filling stations that are located in the heart of the Central Business District (CBD) and surrounded by a highly busy market as potential hazard especially in the event of fire outbreak. This has been emphasized by TCPD in the following words *"the day disaster will strike in a filling station in Wa, it will be disastrous"*. The fear is that the situation in the municipality will not be different from what prevails in the big cities such as Kumasi Accra and Tema regarding filling stations sites.

Conclusion

From the study it can be concluded that though filling stations are volatile projects, their construction do not take full EIA. While some environmental institution thought that full EIA should be conducted for such projects, other environmental institutions thought otherwise which is conclusive that environmental institutions are divided with respect to the subject matter. The low level of collaboration among these environmental institutions has also been observed as an issue that impacts negatively on environmental decision that could influence adversely on the quality of the environment. The 50ft buffer zones to be created between

filling stations and the nearest neighbors (structures, houses/residents, stores and major roads) have not been complied with by 59% of the filling stations in the municipality. This indicates high exposure to risk of living near filling station in the event of fire explosion. All filling stations have not complied with the required distance away from the main road which has implications for future development. There will be a challenge in the near future if the current main roads are to be expanded into dual carriage as stated by TCPD. In the midst of all these contentious issues, environmental institutions are dormant in issuing out sanctions to deter future occurrence.

Recommendation

Based on the findings and problems identified, the following recommendations are put forward requiring some actions that could help address the environmental and social impacts of filling stations activities in the municipality.

Environmental Protection Agency should practically include filling stations projects in category B and strictly demand full EIA before project development. This will promote compliance to laid down standard, reduce risk on environmental components particularly the risk on the human being who reside close to filling stations, and eventually promote quality environment.

There is the need for all key actors in the EIA application to effectively collaborate particularly at the technical committee level which in synergy will take quality decisions that can be translated into an improved environment. Collaboration should not end at the institutional levels but should be extended to nearest neighbors so that their views can be incorporated into the final decision promote sustainable environment.

EPA and TCPD should take pragmatic steps within their operational powers (improved environmental monitoring) to ensure high compliance to safety standards at filling stations and to effect the relocations of filling stations that are located in concentrated residential and business centres in the municipality (particularly those that were establish before the introduction of EIA)

The MA together with TCPD should be resource financially and technically to enable them prepare the necessary schemes that will zone the municipality into appropriate developmental projects to avoid the occurrence of unhealthy competition between filling stations and residential and public structures.

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