PETROL FILLING STATIONS’ LOCATION AND MINIMUM ENVIRONMENTAL SAFETY REQUIREMENTS IN OBIO AKPOR LGA, NIGERIA

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Abstract
The study examines the proliferation of petrol filling stations in relation to the minimum environmental safety requirements by the Department of Petroleum Resources (DPR) that ‘distance from the edge of the road to the nearest pump and from the next petrol filling station should not be less than 15 and 400 meters respectively. The Global Positioning System (GPS) was used to acquire the coordinates of each filling station in the study area and then imported to the ArcGIS 9.3 software environment. Distances between filling stations from the road and from each other were determined using the ArcGIS 9.3 measurement tool alongside buffering analysis in respect to their coordinates. The Z ratio analytical technique was used to examine the conformity of petrol filling stations to the required distance of 400m and 15m from each other and from the road respectively as stipulated by DPR amendment decree 37 of 1997. Findings from the z ratio analysis at 152 degree of freedom and 95% confidence level reveals that the petrol filling stations in the study area neither conform to the required distance of 400m apart nor conform to the required distance of 15m from the road. Thus, the study recommends, among others, the need for the regulatory agency, DPR, to improve their capacity in enforcing the compliance of petrol filling stations with laid down regulations.

Keywords: Proliferation, regulatory agency, petroleum, filling stations, safety requirements,
Introduction

Nigeria is blessed with abundant natural resources and at present, she is the ninth world producer and sixth world exporter of crude oil (CBN, 2010). Despite this, population growth rate has continued to outpaced the ability of Government to build essential infrastructures, enact and enforce legislation needed to make life in safe, rewarding and healthy (W.H.O, 2010). This rapid growth rate of most urban centres has increased the use of automobiles, generators and other petroleum demanding plants. The pathetic power situation in Nigeria has exacerbated the increasing demand for petroleum products, leading to the proliferation of petrol filling stations and consequently, with less consideration of the minimum environmental safety requirements for their operations (Afolabi, Olajide & Omotayo, 2011). Safety practices in locating petrol filling stations are of utmost importance in preventing hazards and reducing potential risks that could affect humans and their environment.

In most large urban areas of Nigeria, there is high demand for land for socio-economic services that are in high demand. This high land demand often results to land scramble and illegal conversion of land uses, leading to haphazard development and the deliberate location of petrol filling stations in unsuitable areas that are highly vulnerable to hazard (KASUPDA, 2009). Several problems have come to be associated with these poorly located filling stations. Today, this has become an important social issue requiring the attention of social critiques and researchers alike. For example, Samuel (2011) acknowledged the significant contributions of petrol filling stations’ location to traffic congestion, pollution, and fire. The dimension and extent of the problems depend on the criteria or variable such as location, size and set back from the road. Thus, it is imperative to study spatial location of petrol filling stations in Obio Akpor Local Government Area in order to determine how they conform to the locational guidelines set by the regulatory bodies.

Study Area

The Study area is one of the 23 local governments of Rivers state, found in the south southern part of Nigeria, otherwise called the Niger Delta Region of Nigeria, located approximately between latitude 4° 45’ N through 4° 56’ N and longitude 6° 52’ E through 7° 6’ E. It has a general elevation of less than 15.24m above mean sea level (Oyegun & Adeyemo, 1999). It is bounded by Ikwerre LGA to the north, Port Harcourt LGA to the south, Oyigbo LGA to the east Emohua LGA to the west, as shown in figure 1.
Figure 1. Obio Akpor LGA Showing Communities with insert Rivers State

Obio-Akpor LGA of Rivers State has a population of 283,294 persons, made up of 145,326 males and 137,968 females (N.P.C, 2006). From field work carried out by authors, there are about 153 filling stations in the study area which were considered as the target population as shown in figure 2.
Source: Authors’ Fieldwork, 2014.

Figure 2 Obio Akpor LGA Showing the Location of Filling Stations

Materials and Methods
The acquisition of petrol filling station data in the study area was carried out using the global positioning system (GPS). The GPS was used to acquire the coordinates of each petrol filling stations, in respect to the first pump and the road edge. The GIS software (Arc GIS 9.3) enabled the determination of distances between the first pump from the road edge and one petrol filling station from another within the study area. The Z ratio analytical technique was used to determine the level of conformity of petrol filling stations to the required distance from each other and from the road as stipulated by Department of Petroleum Resources (DPR) guidelines for approval to construct and operate petroleum products dispensing.
Data Analysis
The petroleum filling station amendment decree no. 37 of 1977 safety rules and regulations stipulate site inspection by DPR of proposed filling station, so as to among other things, issue report on the following basic requirements:

(i) Size of the proposed land site.
(ii) Whether site lie within pipeline or electricity high tension cable Right Of Way (ROW).
(iii) Distance from the edge of the road to the nearest pump (not less than 15 meters).
(iv) The number of petrol stations within 2km stretch of the site on both sides of the road will not be more than four, including the one under consideration.
(v) The distance between an existing station and the proposed one will not be less than 400 (four hundred) meters.
(vi) The drainage from the site will not go into a stream or river.
(vii) In some instances where site is along Federal Highway, a letter of consent from the Federal Highway is required.
(viii) DPR guided/supervised EIA study of the site by DPR accredited consultant.

This study is concerned with regulation number iii & v which state that:

a) The distance from the edge of the road to the nearest pump will not be less than 15 meters.

b) The distance between an existing station and the proposed one will not be less than 400m (four hundred meters)

Buffering technique in the GIS environment was used to analyse the spatial conformity of petrol filling stations across the study area in relation to required standards.
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**Source:** Authors’ Field Work, 2014
The Z ratio analytical tools was used to determine the level of conformity of petrol filling stations to the required distance from each other as stipulated by DPR guidelines for approval to construct and operate petroleum products filling station amendment decree no. 37 of 1977.
Table 2 Measured Distances of Petrol Filling Station from another using their Coordinates in ArcGIS 9.3

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Source: Authors’ Field Analysis, 2014
Z Calculated = 0.41

Degree of freedom = N-1= 153-1=152

Z critical = 1.65

Z calculated = 0.41

Since z critical is greater than z calculated at 152 degree of freedom at 95% confidence level, hence, the distance among petrol filling stations in Obio Akpor Local Government Area does not conform to the required standard.

Source: Authors’ Field Analysis, 2014

Figure 4 Petrol filling stations in Obio Akpor Local Government Area

Figure 4 shows the location of Filling Stations in Obio Akpor LGA. The locations so derived aided in classifying the petrol stations as conforming or non-conforming.
Source: Authors’ Field Analysis, 2014
Figure 5 Conforming petrol filling stations in Obio Akpor Local Government Area

The figure 5 above shows that only 35 filling stations conform to the DPR guideline of 400m distance from one another.
Source: Authors’ Field Analysis, 2014
Figure 6 Non conforming petrol filling stations in Obio Akpor Local Government Area

The figure 6 above shows that 118 filling stations did not conform to the DPR guideline of 400m distance from one another.
The Z ratio analytical tools was used to determine the level of conformity of petrol filling stations to the required distance from the road as stipulated by DPR guidelines for approval to construct and operate petroleum products petrol filling station amendment decree no. 37 of 1977 safety rules and regulations iii stated that: The distance from the edge of the road to the nearest pump will not be less than 15 meters.

Table 3 Measured Distances of Petrol Filling Stations from the Road

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Source: Authors’ Field Analysis, 2014
Degree of freedom = N-1 = 153-1 = 152

Z critical = 1.65

Z calculated = 0.33

Since $z$ critical is greater than $z$ calculated at 152 degree of freedom, at 95% confidence level, hence the distance from the road among petrol filling stations in Obio Akpor Local Government Area do not conform to the required standard.

Source: Authors’ Field Analysis, 2014

Figure 7 Conforming petrol filling stations in Obio Akpor Local Government Area to distance from the road

The above shows the conforming petrol filling stations in the area to required distance from the road.
The above shows the non conforming petrol filling stations in Obio Akpor LGA in relation to required distance from the road by regulation.

**Conclusion**

The analysis of the spatial distribution of filling stations in the study area reveals that conformity to 400m required distance from one another was met by only 35(23%) out of the 153 petrol filling stations in the region, while the remaining 118(77%) did not conform. Also, the analysis of petrol filling stations’ conformity to the required 15m distance from the road shows that only 50(33%) petrol filling stations conformed while 103(67%) petrol filling stations did not.
Recommendations

This study therefore make the following recommendations to ensure public safety in the light of the findings: improved public participation in environmental monitoring and auditing of hazardous public facilities; improved project screening techniques and tools to reduce risks; improved enforcement of all applicable legislations and procedure for locating petrol filling stations.

REFERENCE


