



Safety Management of Gas Station in Lagos to Forestall Explosion, Injuries and Fatalities

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ABSTRACT

Gas station explosion have become a recurring event Lagos state which has led to the loss of live and properties worth millions without any safety management in place. From the findings in this study about safety management, it was deduced that safety management are very essential in gas and oil industries because they help to enhance the organisation's safety, mitigate accidents, mitigate explosion, injuries and fatalities, reduce lost time and other materials and product losses and the numerous cases of gas station explosion in Lagos state has shown that there is no safety management or there are lapses in the safety management in most gas station in Lagos state hence there won't be incessant occurrences of gas station explosion in Lagos state. Among the causes of continuous gas station explosion in Lagos state, it was deduced that Lack of Effective Emergency Management, Lack of Leadership Commitment, Lack of Proper Management of Third-Party Interference, Lack of Education and Awareness of People/Stakeholders, Not Learning from Past Incidents, Lack of Enforcement & Monitoring Systems are the major causes of gas station explosion. Safety management practise to forestall gas station explosion in Lagos state was provided and it was recommended among others that Lagos state government should wake up and ensure that master plans of their respective jurisdiction in the state are kept safe so as to minimize the number of casualties through gas station explosion.

Keyword: Gas Station, Gas Explosion, Safety Management

1 INTRODUCTION

A typical gas station fatality&explosion is an explosion resulting from mixing a gas, typically from a gas leak, with air in the presence of an ignition source. In household accidents, the principal explosive gases are those used for heating or cooking purposes such as natural gas, methane, propane, butane. In industrial explosions, many other gases, like hydrogen, as well as evaporated gasoline/petrol or ethanol play an important role.

In Lagos state, gas station explosion have become an incessant event across the country raising questions about public safety. On 16 January being Monday, 2018, a gas explosion took place at Magodo, a suburb of Lagos. As at press time, 10 people were feared dead. Before this disaster, there have been other cases in Osogbo, Delta, Warri and Badagry, Owerri, Imo State and Nnewi in Anambra State without any safety management in place (Leadership, 2018). Sometimes there are occurrences in homes and remote villages out of the sphere of coverage of security and regulatory authorities that escape the public glare. Always, when these explosions occur, they record casualty levels that should raise the red flag. In none of those explosions was anyone held accountable ordemands for compensation made. The danger in these incidences is the possibility of collateral damage as these gas stations are located in mostly residential areas which expose the people to avoidable hazards to their lives and property (Leadership, 2018).

Thus, this paper looked at the features of safety management, recorded cases of gas explosion in Lagos state, causes and safety management of gas station explosions and preventive measures to be undertaken to mitigate gas station explosion in Lagos state and Nigeria as a whole.

2. CHARACTERISTICS OF SAFETY MANAGEMENT

According to Elke (2007), he defined safety management as a system developed to manage the risk to personnel, property, production, environment and ultimately a life of an individual.

According to HSE (2013), safety management systems holistically deal with the organization's safety activities, policies, practices, responsibilities, procedures, and resources to forestall accidents and ensure that risk is mitigated as low as is reasonably practicable, which is normally carried out through Plan-Do-Check-Act business management system, and it is a crucial mechanism in the delivery of safety.

Bayuk (2008) explained safety management as part of business operation through which a firm proactively manages safety that concentrates on

controlling business processes, starting from the policy, organisation structure, organisation safety culture, training, communication, hazard identification, risk management, emergency response and incident investigation. It is a management approach through which a safety policy is established with objectives, set out a plan to achieve these objectives, work towards the objectives and continuously checking the outcomes against the plans, and most importantly, take appropriate corrective actions as a result of lessons learned from past experience.

There are different opinions on the essential components of safety management system but the special aim of these different components are identification of hazard, proper management of risk, maintain firm's safety performance, apply lessons learned from past incidents, continuous monitoring and assessment of safety performance, and continuous improvement of overall performance of the safety management system (Thomas, 2011). Mitchison and Porter (1998) set out seven fundamental and important elements that should be addressed by safety management system.

Table 1: Elements of Safety Management System. **Source:** Mitchison and Porter (1998)

ELEMENT OF SAFETY MANAGEMENT SYSTEM	PURPOSE
Pinpointing and assessment of major hazards	Develop and implement procedures to systematically pinpoint and assess hazards arising from all the stages of its activities
Operational Control	Prepare, keep up to date, and implement procedures for safe operation, including maintenance of gas station plant, processes, equipment and temporary stoppages
Management of Change.	Adopt and implement management procedures for planning and controlling all changes in processes and process variables, materials, equipment, procedures, software, design or external circumstances which are capable of affecting the control of major accident hazards
Planning for Emergencies	Develop, adopt, and implementation of procedures to pinpoint foreseeable emergencies by systematic analysis and to prepare, test, revise, updated and review emergency plans to respond to such emergencies
Monitoring Performance	Maintain procedures to ensure that safety performance can be monitored and compared with the safety objectives. Active monitoring by inspections and assessment of compliance with training, instructions and safe working practices. Reactive monitoring by effective incident/accident report and investigation system
Audit and Review	Audit to ensure that the firm, processes, and procedures as defined and as actually carried out are consistent with the Safety Management System. Review to ensure the safety management appropriately fulfil the operator's policy and objectives.

Elements of Safety Management System. **Source:** Mitchison and Porter (1998)

Safety management systems are very essential in oil and gas industries because they help to enhance the organisation's safety, mitigate accidents, mitigate explosion, injuries and fatalities, reduce lost time. Bayuk (2008) in the presentation of using safety management system as a template for aligning safety with business strategy in oil & gas industries outlined the benefits of safety management system as follows:

Mitigation of the direct and indirect costs of accidents: Fines, repair costs, damage claims, and increased insurance premiums.

Improved employee morale and productivity: Promoting communication between management and the rest of the firm prevents disenfranchisement and lifts morale.

Establishing a marketable safety record: A record of consistently safe operations can be used to attract new business and investment.

Logical prioritization of safety needs: Safety management system emphasizes risk reduction actions that provide the biggest impact on both safety and the bottom line.

Compliance with legal responsibilities for safety and other standards that can be included in a firm's safety management system.

More efficient maintenance scheduling and resource utilization: Effective hazard reporting in safety management system allows proactive scheduling of maintenance tasks when resources are available, increasing the likelihood that maintenance is performed on time and more efficiently.

Avoiding incident investigation costs and operational disruptions: Improved communication and risk mitigation will prevent many accidents from

ever occurring.

Continuous improvement of operational processes: Safety management system allows for lessons learned to be incorporated into the system and lead to superior operations.

3.0 ANALYSIS OF CASES OF GAS STATION EXPLOSION IN LAGOS STATE

On October 9, 2020, an explosion from a gas station occurred in the Baruwa area of Ipaja that claimed about 8 lives with many properties destroyed. The explosion which occurred at the early hours of Thursday happened as a result of leakage in one of the gas containers in the premises of Best Roof Gas Station. The leakage causes a blast which causes fire that engulfed properties worth millions of naira and claimed 8 lives (Naijametrics, 2020).

Another report which occurred on July 29, 2016, a 68-year-old woman, simply identified as Mrs. Olawepo and a property manager, Alhaji Nurein Kutere were injured following a gas explosion in a kiosk in Ebute Meta, Lagos which occurred as a result of leakage from the gas container. The incident occurred around 3am on Jebba Street near Freeman Street, Ebute-Meta. The explosion destroyed some properties including three parked vehicles. Mrs. Olawepo was injured in the face. It affected her eyes, forehead, and nose. While scampering to safety, Alhaji Kutere injured his leg. Mr. Babatunde a resident of the area in Oshodi explained that the explosion was scary. He lamented that the residential area has turned to a marketplace as kiosks and shops outlets dominate it (Abdul and Esemuze, 2016).

Also, another gas station explosion that rocked Iju-Ogundimu, a community on the outskirts of Lagos, on Thursday 27th of September 2020 recorded severe casualties. It was reported that 30 persons were injured in the fire that also burnt 15 vehicles and razed 23 buildings, including X and Y Event Centre. The explosion occurred around 3 pm as two gas tankers were being offloaded at a gas station owned by Manna Gas Ltd. It was said that one of the tankers, a 30-tonne LPG, had a compromised seal valve which resulted in leakages and subsequently led to an explosion when the truck experienced tyre burst (Thenationonline, 2020).

Another gas station explosion rocked the city of Lagos. At least ten people were reportedly killed in the explosion at the Second Coming gas station in the Magodo Estate area of Lagos on Monday, January 15, 2018. The explosion was caused by a spark generated by a car which subsequently generated into fire (Garda, 2018).

Also reported by Vanguard (2019), they stated in their report that an explosion from a local gas station rocked Aguda area of Surulere, Lagos, yesterday, destroying buildings, cars and goods worth several millions of naira. Four vehicles and three motor bikes parked in a mechanic workshop were burnt, while a bungalow and a mosque were partially affected by the fire. Some residents sustained minor injuries during the stampede that ensued. Meanwhile, owners of the affected shops were lamenting their losses, claiming that they kicked against the gas station being sited close to residential buildings when it was opened, but that the owner of the building and most residents turned deaf ears to their complaints. One of them, Nnamdi Chionye, said: "I lost all my goods in the fire. When the gas station was opened, we knew it was a disaster waiting to happen. We complained but nobody listened to us."

The table below shows the summary cases of gas station explosion in Lagos State between 2016 to 2021.

S/N	Cases	Location	Year	How It Happened	Casualties
1	A gas station explosion occurred in the Baruwa area of Ipaja Lagos state.	Baruwa area of Ipaja	2020	Leakage in one of the gas containers	The accident claimed 8 lives and many properties were destroyed.
2	A gas explosion in a kiosk in Ebute Meta, Lagos	Ebute Meta Lagos	2016	Leakage in one of the gas containers	The explosion destroyed some properties including three parked vehicles.

3.	Another gas station explosion rocked Iju-Ogundimu	Iju-Ogundimu, A community at the outskirts of Lagos	2020	It was said that one of the tankers, a 30-tonne LPG, had a compromised seal valve which resulted in leakages and subsequently led to an explosion	30 persons were injured in the fire that also burnt 15 vehicles and razed 23 buildings, including X and Y Event Centre.
4.	Another gas station explosion rocked the city of Lagos	Magodo Estate area of Lagos	2021	The explosion was caused by a spark generated by a car which subsequent generated into fire	At least ten people were reportedly killed in the explosion
5.	Explosion from a local gas station rocked Aguda area of Lagos	Aguda Surulere Lagos	2019	Unknown	It destroyed buildings, cars and goods worth several millions of naira. Four vehicles and three motor bikes parked in a mechanic workshop were burnt, while a bungalow and a mosque were partially affected by the fire.

From the cases above, it could be deduced that there are several gas station explosions which have a severe impact on the lives and properties of the citizens of Lagos State. Although the present administration of Babajide Sanwo-olu had promised that his administration would take stiffer measures against operators of gas plants or combustible items in the state to forestall any reoccurrence of the explosion that has been rocking the state but the cases keep increasing and there haven't been any safety management or measures to forestall this dangerous occurrences.

4.0 CAUSES OF CONTINUOUS GAS STATION EXPLOSION IN LAGOS

There are several causes of ineffective safety management of gas station which leads to explosion, injuries and fatalities. They include the following below:

Lack of Effective Emergency Management

There have been several reports of gas container leaks in a gas station which is due to lack of emergency management procedures as several of these leaks developed into fires and explosions. A safety management system is incomplete without a comprehensive emergency management system. Emergency management systems help an organisation running a gas station to have a response plan clearly outlining procedures to follow, improve their safety management system, safeguard their assets, minimise injury and loss, and provide proper communications to the public and stakeholders in case of accidents.

Lack of Leadership Commitment

The recurrence of gas station explosion incidents shows complete lack of proper leadership commitment towards the future safety of people and forestall accident. This applies to the government as well as gas station management. When the management fails to learn from past incidents and ignores the safe operation of their assets there will be a poor organisational safety management system. Bayuk (2008) explained that leadership commitment to safety does not only involve establishing policy, providing direction and targets, but also requires a strong focus on safety through communication, commitment, participation, providing resources, and taking responsibilities for addressing safety issues. The lack of a properly designed and implemented legal framework that imposes serious sanction on gas station management is not helping to focus attention on the role of managers and the need for their total commitment to safety and loss forestall.

Lack of Proper Management of Third-Party Interference

Settlement and urbanisation have knowingly or unknowingly intruded into stating gas station business thereby exposing people to hazards. Houses and businesses are built too close to gas stations and Aguda Lagos gas station explosion in the year 2019 that was reported by Vanguard (2019) is a major example. The explosion destroyed buildings, cars and goods worth several millions of naira. Four vehicles and three motor bikes parked in a mechanic workshop were burnt, while a bungalow and a mosque were partially affected by the fire. This was a direct result of poor management of third-party

interference. There was lack of proper monitoring and surveillance of population movement and utilisation of land, poor deterrence of third-party infringements, and poor land use planning & management.

Lack of Education and Awareness of People/Stakeholders

People lack awareness and education to understand that it is wrong to start a gas station business in a residential domain. Some of the reported cases of gas station explosion is a result of the close proximity of the gas station to residential area. Also, the government has failed in its position to create awareness about planting gas station in residential areas.

Not Learning from Past Incidents

One of the surest ways to improve a safety management is by learning from past incidents. So many people have lost their lives through gas station explosion incidents in Nigeria with alarming similarities of the accidents which indicate that no lessons have been learned from these tragedies. Moreover, there were no proper documentations of past accidents which made learning from past incident a difficult task.

Lack of Enforcement & Monitoring Systems

It is as good as not having a legal framework where there is no effective enforcement and monitoring system. Effective monitoring and enforcement by a regulator are very crucial to the effectiveness of any regulatory system, and this is facilitated by sufficiently robust laws that are comprehensive and consistent with a range of sanctions to help compel compliance and maintain effective enforcement (Ogbodo, 2009). The Department of Petroleum Resources (DPR) in the Federal Ministry of Petroleum exercises the statutory supervision and control of the oil and gas industry including planting of gas stations with legislations and guidelines on the operation and maintenance but there is a very weak enforcement and monitoring system

5.0 SAFETY MANAGEMENT PRACTISE TO FORESTALL GAS STATION EXPLOSION IN LAGOS STATE

In order to ensure the safety of the citizens of Lagos State and to forestall gas station explosion, the following safety management practice are to be employed by the Lagos state government.

Don't use Cell Phones in a Gas Station

Stories about the dangers of cell phones and gas stations have been circulating for years. While some assert that the danger of using cell phones at gas stations is nothing more than an urban legend, there is evidence that cell phone usage near gas pumps does pose explosion risks.

Neither cell phones or full-function pagers are designed to be used in any type of ignitable environment. Certainly, any area where fuel is being pumped is one where risk of ignition is high. There are situations in which cell phone usage can create sparks capable of igniting a fire or causing an explosion in such an environment.

Check the owner's manual that came with your cell phone, and you will likely see a warning against using the device while refuelling a vehicle or in any other situation where you are exposed to gasoline or fumes.

Forestall Smoking in a Gas Station

Whether you are refuelling your vehicle or just sitting inside, smoking or lighting cigarettes poses a serious safety risk. A single spark from a cigarette, match or lighter can cause a serious explosion at a gas station. It is not safe to smoke or use matches or lighters while on the grounds of a gas station, even if you aren't actually pumping gas.

Don't Leave Engine Running

It is very important to turn off your car's engine while pumping gas. Gasoline vapor that comes into contact with electrical wires while an engine is on can trigger an explosion.

Stay Stationary in Your Vehicle

You should not get in and out of your automobile while you are pumping gas. Doing so poses a risk of static electricity, which can ignite gasoline vapours. If you absolutely have to enter your vehicle during refuelling, it is a good idea to touch the metal on your car (far away from the gas tank) before you take the nozzle out.

Always be Alert

Even though pumping gas is an everyday occurrence for many people, don't lose sight of the fact that you are responsible for transferring a hazardous substance from one point to another. Don't put yourself or other patrons at needless risk by not paying attention to what you are doing.

Watch for Overflow

It is dangerous to let gas tank overflow. Overflowing fuel that flows to the ground poses a safety risk. Additionally, gasoline is a skin irritant, and can cause reactions ranging from very mild irritation to serious burns. It is a good idea to get in the habit of waiting a few seconds after you stop pumping gas before removing the nozzle to help prevent drips.

Adults Only

Children should never be allowed to pump gasoline. Anyone who is too young to drive a car legally is too young to pump gasoline.

6.0 CONCLUSION & RECOMMENDATION

Gas station explosion have become a recurring event in Lagos state which has led to the loss of live and properties worth millions without any safety management in place. From the findings in this study about safety management, it was deduced that safety management are very important in oil and gas industries because they help to enhance the organisation's safety, mitigate accidents, mitigate explosion, injuries and fatalities and the numerous cases of gas station explosion in Lagos state has shown that there is no safety management or there are lapses in the safety management in most gas station in Lagos state hence there won't be incessant occurrences of gas station explosion in Lagos state.

This paper highlighted the causes of continuous gas station explosion and safety management practise to forestall gas station explosion in Lagos state which when enforced will go a long way in mitigating gas station explosion in Lagos State.

The following recommendation were made:

1. It is advisable that we all have gas detection instrument which helps to prevent loss of life and gas explosion before time.
2. Again, there is a need to educate yourself deeply on gas management before using it or going into the business.
3. It is very important that Lagos state government should wake up and ensure that master plans of their respective jurisdiction are kept so as to minimize the number of casualties through gas station explosion.
4. It is also advised that supervisory agencies work aggressively in ensuring that gas stations are located according to the master plan of the state which should be far from residential areas and most importantly, routine check-up should always be done on gas stations to avoid gas explosions.

REFERENCES

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- Abdul, F. & Esemuze, J. (July 29, 2016). Two injured, vehicles burnt in gas explosion. The Nation online. Retrieved from <http://thenationonline.net/two-injured-vehicles-burnt-gas-explosion/>
- Bayuk A.J. (2008), Aviation Safety Management Systems as a Template for Aligning Safety with Business Strategy in the other industries. Ventures International, LLC., 400 South 2nd Street, Suite 402-B, Philadelphia, PA 19147. The America Society of Safety Engineers (ASSE) <http://www.asse.org/education/businessofsafety/docs/AJBayukPaper.pdf>
- Elke, H. C. (2007). Application of the Process Safety Management Standard in Canada. In ASSE Professional Development Conference.
- Garda (2018). Ten killed in gas station explosion in Lagos Jan. 15. Available on: <https://www.garda.com/crisis24/news-alerts/85771/nigeria-ten-killed-in-gas-station-explosion-in-lagos-jan-15>
- HSE (2013). Safety Management Systems. Health and Safety Executive. <http://www.hse.gov.uk/offshore/managementsystems.htm>
- Leadership (16 January, 2018). Nigeria: gas plant explosions. The Guardian papers. Retrieved from <https://allafrica.com/stories/201801160094> Access Date: 13-9-2018.
- Mitchison N. and Porter S. (1998). Guidelines on a Major Accident Prevention Policy and Safety Management System, as required by Council Directive 96/82/EC (SEVESO II). Joint Research Centre, European Commission.
- Naijametrics (2020). Gas station explosion: Lagos enforce stiffer measures on operators, blames negligence. Available on: <https://naijametrics.com/2020/10/09/gas-station-explosion-lagos-to-enforce-stiffer-measures-on-operators-blames-negligence/>
- Ogbodo, S. G. (2009). Environmental Protection in Nigeria: Two Decades after the Koko Incident. Ann. Survey. Int'l & Comp. L., 15, 1.
- Thenationonline (2020). How day-old baby, mother, others escaped death in Lagos gas explosion. Available on: <https://thenationonline.net/how-day-old-baby-mother-others-escaped-death-in-lagos-gas-explosion/>
- Thomas, M. J. (2011). A Systematic Review of the Effectiveness of Safety Management Systems. ATSB Transport Safety Report.