



A Concise Review of Employee Capacity Development Training on the Use of Eco-Friendly Technologies in the Nigerian Oil and Gas Industry

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Abstract

Technology has been useful to man's industrial cravings. It has also contributed to various impacts on human existence that has triggered technologists to innovate eco-friendly machines and equipment that enables economic, environmental and developmental success and sustainability. As industrialization progresses in developing countries, as is seen in developed societies, usage of eco-friendly equipment in oil and gas industry in developing nations is yet to be wholesomely adopted. However, effective employee training in oil and gas is crucial to human capacity building in the use and sustenance of eco-friendly technology in oil and gas industry. The paper investigated employee training and eco-friendly technology in oil and gas industry in Nigeria. Therefore, the objectives of this study is to determine the state of compliance of oil producing companies to eco-friendly technology in Nigeria, and to evaluate how employee training on the use of eco-friendly technology impacts on elimination of gas flaring in Nigeria. In this vein, the research questions are thus: what is the state of compliance of oil companies to eco-friendly technology in Nigeria? And how has employee training on the use eco-friendly technology impacted on elimination of gas flaring in Nigeria? The study employed descriptive research design to elicit data from relevant oil and gas companies through secondary sources. However, the findings show that oil companies in Nigeria are non-compliant to the use of eco-friendly technology in oil and gas exploration activities as there are still gas flaring in oil and gas exploration activities. It also reveals that employee training is significant to the use of eco-friendly technology in the elimination of gas flare in oil and gas exploration activities. Therefore, the study recommends that oil and gas companies involved in exploration activities in Nigeria should interface with other international partners to purchase eco-friendly equipment and machines for oil production activities. Government should stipulate mandatory regulation and support that will enable compliance to the use of eco-friendly technology in oil and gas industry in Nigeria.

Keywords: employee training, eco-friendly technology, oil and gas exploration, companies, gas flaring

1. 0 Introduction

Environmentally or Eco-friendly technology is a fast developing field in almost all industries. This centers on new ways of scientific and technical methodology that improves the industrial environment and protects the inhabitants of the earth. Furthermore, it requires training of individuals involved in oil and gas exploration to understand its importance to humankind existence in the earth. It is quite observed that eco-friendly technology can benefit biotic and abiotic environment. The earth and all of its dwellers stands to benefit from any technology that supports its existence rather than that, that can destroy living things. This ideology begs for more intuitive training of all oil and gas employees involved in oil exploration activities by their employers. Eco-friendly technology is also called "green technology," as it is committed to preserving and sustaining the green and other natural resources.

Eco-friendly technology and scientific methods involve the innovation, development and sustainability of new clear cut technologies as well as improving on existing or obsolete ones. As these innovations,

improvements, and scientific discoveries are invented, they can help the global ecosystem, and impact on the lives and environment of people on daily basis even at individual level. All technologies have direct or indirect affect on the everyday lives of employees who utilize them and those who are proxy to their industrial waste. More so, improving on how individuals conducts basic tasks as in cleaning, heating, and cooling their home, cooking in kitchen eco-friendly technologies have made it possible and easier to minimize the environmental risk impact which most people do have on the earth regularly. However, eco-friendly technology uses several methods to reduce the usual impact that certain actions have on the earth. To ensure that technology is environmentally friendly, its product should be such that preserves lives and organisms in the earth, promotes and sustains the earth for future generations, and produce harmless or controlled waste and pollution as much as possible, and reuse or recycle waste materials whenever it is possible for further environmentally friendly purposes.

Previous literature has indicated that eco-friendly technology can influence industrial activities to the preserving of the industrial and green environments, and protecting human lives. (Pranjali, 2015) opines that society can have change through the use of green technology. However, it is believed that the key to sustainable development is eco-friendly technology which can also be applicable in oil and gas industry. Therefore, having knowledge on green technology is necessary among employees involved in oil exploration activities among oil and gas producing companies globally. Therefore, the study seeks to investigate how compliant oil and gas companies are to eco-friendly technology in oil and gas exploration activities, and to ascertain whether employees are provided training to use eco-friendly technology to eliminate gas flare in Nigeria.

1.1 Objectives of the study

The objectives guiding this study is to

- (i) Determine the state of compliance of oil and gas producing companies to eco-friendly technology in Nigeria,
- (ii) Evaluate how employee training on the use of eco-friendly technology can reduce gas flaring in Nigeria.

1.2 The research questions are thus:

- (i) What is the state of compliance of oil and gas companies to eco-friendly technology in Nigeria?
- (ii) And how has employee training on the use eco-friendly technology helped to reducing gas flaring in Nigeria?

2.0 Employee training

Training as a concept has been defined to be a systematic process with the aim to assist employees on enhancing their knowledge, capacity and skills, as to imbibe and demonstrate positive behaviour via learning and cognitive experience which can help them achieve greater value and performance (Buckley & Caple, 2009). Accordingly, training ushers in various advantages to employees by widening or expanding their knowledge, capability and skills as to become more efficient, reliable and oriented members of the firm, thereby improving on career development (Jun, Cai, and Shin, 2006).

Training may not only enhance employees on being resourceful, but also guarantee them with every opportunity to systematically learn and master their jobs to perform more acceptably and competently. Training is spotted as a pervasive process and method to improve on the output of individuals and transmitting organizational objectives and goals to employees (Ekaterini & Constantinos-Vasilios, 2009). In addition, (Rohan & Madhumita 2012) also argued that investing in training of employees on work decision making, problem-solving, teamwork and on issues of interpersonal relations has positive impact on various companies' level of advancement, as well as enhanced employees' performance. Training have effect on employees' behavior and their working skills that provides employees enhanced work performance and

technique changes (Satterfield & Hughes, 2007). Training is seen as most effective process of ensuring and sustaining high quality results in human resources of any organization. However, training is a sure way of enhancing workers' commitment and plan to maximizing employee key potential. According to (Colombo & Stanca, 2014) training is an important instrument which fundamentally can affect the successful achievement of organizations' core goals and objectives. Thus, employees' efficiency and effectiveness may depend on the appropriate training and development programme provided by the organization for the purpose of achieving innovative changes.

Training is an organized process in which firms provide development momentum and enhance quality and skill of new intakes and existing workforce toward new technologies. Training is seen as one systematic approach to learning and development as to improve individual worker, group of workers and organization as a whole (Khawaja & Nadeem, 2013). It serves as means of intervention that can improve organization's products and services quality through the technical skills learned by employees.

The business environment of oil companies appears to be challenging by the high competitiveness among other organizations, globalization, oil markets and eco-friendly technological advancement. To survive in these challenging situations, companies need to seek for the potential ways to innovate sustainable competitive processes. To this end, the knowledge, abilities and skills of employees or workforce in any organization will have to increase to become very necessary to its performance, and have advantage in the global competitive technological industry, and continuous advancement for sustainable development in society (Elnaga & Imran, 2013). This holds that the capabilities, skills and knowledge of all talented employees were viewed to be one major determinants for sure advantage in technological advancement and advantage in global marketplaces (Becker, Bose, & Freeman, 2006)

Today several companies are spending and investing huge sums of money on improving employees through adequate training and development courses in order to remain competitive and successful in the global oil and gas industry. The momentum of training for workers is vastly growing and companies are making use of this tool to steadily compete with other competitors in the global oil and gas industry.

2.1 Eco-Friendly Technology

The emergence of technology in history has overtime witness several transition in societies. One of the trending technology in the world is the eco-friendly or green technology. Green technology supports and enhances a "good life" for all people, in rich and poor countries, developed and developing countries in the globe. Eco-friendly technology is without compromise to the earth's ecosystem or the prospects for future generations. A good and worthwhile life in society requires most often that basic human wants or needs are provided and that aspirations for freedom, sense of belonging, and more so, self-realization are met as much as can be realistic (Stutz, 2006). It goes beyond the maximization and utilization of material production nor its consumption. However, we view technological innovation with the mind and context of the good life it affords to people. Further, technology can be supportive or threatening to human existence depending on the manner technological creations and innovations are influenced as well as controlled by human institutions and decisions.

There are three meanings to the term technology. It refers to instruments and tools used to enhance human ability to either shape or design nature and provide solution to problems (as in hammer and nail), technology means the know-how on innovation and creating things or how to solve problems (such as to make an atomic or nuclear bomb), it is the culture of people (understanding of our value systems). Historically, human civilization emergence has been connected to the idea of developing tools for agriculture, irrigation, hunting and water management, as well as navigation in sea. In the provided second meaning that knowledge describes technology, it becomes very clear in that understanding how to fabricate and use tools or instruments becomes understood as transmissible technological knowledge or know-how. Tied to the second meaning of technology is the invention and development of systematic or scientific knowledge, based on modern

empirical observations, typical hypotheses, and conclusion as well as generalizations on the basic natural laws that concerns the behavior and reactions of material things and the sociable living environment. In the third perception, as culture, technology has evaded all parts of society to such an extent that separating technology from culture is not meaningful. All human endeavours and activities, like nutrition, housing, transportation, leisure, work, even art, sculptures and imagination, become heavily pervaded with technology. We “own” products of technology via a process of “cultural appropriation”, in which the utilization of technologies can be learned, given meaning, and interpreted, in daily life. (Hard and Jamison, 2005). We are all in a “culture technique” in the view that every deepest and most personal knowledge, emotions and feelings are evaded by technology.

The idea and perception that technology do have some unintended or unwanted consequences is a trending relatively new. Although in the early nineteenth century the Luddites smashed the machines viewed to threat to their lives while on employment, while the Romantics protested the dehumanizing movement of industrialization, more widespread is the anxiety and resistance to technology which later emerged mid-1900s. Furthermore, the destruction erupted by the atomic bombing consequences of Hiroshima and Nagasaki stirred most people to question the nature of scientist’s ethical and social responsibility between societal and scientific progress, and technological innovation or invention. Technology came under much scrutiny due to the use of Agent Orange during the U.S. and Vietnam War and the persistence effects of dioxin contamination and birth defects among U.S. service members and the Vietnamese thereafter. Further, came the massive protests against emergence of nuclear energy and the potential health consequences resulting from low doses of radiation from possible nuclear testing, prevalent uranium mining, and deposits of nuclear waste with other environmental degradation and health problems.

3.0 Technology Contribution to Sustainable Global Workflow

Technologies co-evolve overtime with societies in both ancient and modern (Saviotti, 2005); technological innovations and inventions influence society and society also evade technological development. Therefore, the question and decision regarding the invention, direction and development of new technologies have often been asked with no answer readily available. Furthermore, the growth of science and technology particularly from fabricated tools to more encompassing culture prevented inquiries about their helmsman-ship, particularly the reality of democratic pattern of decision-making which can be a guide. The dominant philosophy then obscured questions about technological development, and history of science and technology that emerged. This posited that every scientific invention is especially driven by individuals’ innate curiosity making scientific discovery to lead to automatic and technological utilization for commercial deployment.

The effectiveness of technology in the early twenty-first century is evident as is seen tackling several global challenges. Meanwhile, since the period of Enlightenment, science-concentrated technology, has provided the promise and hope of a better or desirable society via eradication of disease, pandemic and has contributed to material improvements in the world to maintaining a good standards of living. More so, natural resources extraction and exploration, emissions of hazardous or dangerous materials, and the pollution of the atmosphere, water bodies contamination, and soil degradation have caused conditions for unwanted environmental catastrophe which have presently caused serious irreversible damage humans and other organisms or the biosphere. There is futuristic promise of vast acceleration in terms relating to technological innovation and development, however, the extent and impact of prevalent environmental degradation may continue to reflect the damages as well.

An aspect of worry is that despite the ongoing and countless technological revolution, billions of people in the world still lives in abject and acute poverty with inaccessible, inadequate and unavailable food, standard housing, and uninterrupted energy. Still majority are plagued by diseases and illnesses that may easily be cured if there is availability of clean water and common drugs. Fortunately, a few of former “developing” countries have now attained to developed status through technology transfer, technological innovations and inventions

that have benefited most of their populations. These countries include, India, China, Korea, Singapore, Taiwan and, even Brazil. Moreover, the majority of populations in Asia, Africa and Latin America, the benefits of modern technology still remain a dream, even where new technologies as in photovoltaic cells, Internet and cellular phones could make them have a feel of technology. The contradictions erupting between a desirable life supported by technology for mostly wealthy few, and persisting environmental degradation that causes persistent poverty and suffering for the larger population call for a passionate exploration and understanding emanating from technology and its link to society, mostly for sustainable society

Human needs can be fulfilled by few materials and energy. Therefore, human fulfillment is also accelerated by a better lifestyle that do acknowledge non-material needs to be as necessary as could material needs. In a rapidly globalizing world the hedge between the rich and poor, North and South, and between varieties of religions and cultures have been dismantled to a degree at which each individual truly acknowledges to be a “global citizen”, with the responsibility toward “global neighbors” as well as future generations. Having ecological sense can help to preserving ecological capital through the combination of a careful environmental assessment and management, and the utilization of cutting-edge inventions and technologies to attain material functions (Sarika, 2015).

Green technology advantages have not just helped in minimizing pollution levels but it also provided the solution of time saving. The concern in the 21st century is the concentration on environmentally or ecofriendly technologies. Environment minded entrepreneurs are shifting focus to ecofriendly technologies for sustainable society and better life. Companies in most countries are being mandated statutorily to use various eco-friendly technologies in different industries with governments passing strict regulations and supervising it through its agencies. These regulations can make manufacturing, oil and gas exploration and waste management practices produce less or no pollutions. With ongoing reforms taking place in the global energy sector, it will be naturally understood that new green technologies are emergent to satisfying the green aspect of the global energy sector (Sarika, 2015).

In the foregoing regard, Pranjali (2015) posits that eco-technologies are regarded to be cheaper and easier for the producer or manufacturer who uses them over a longer time. Using sustainable technologies can lead to money saving. Also, using biodegradable items or materials can be more advantageous for reducing waste level and its impact to the green environment and more essentially the human body. However, where less waste is produced during manufacturing or production, or during oil and gas exploration, and other products and the used energy is renewable this becomes less stressful both on the environment and human beings. There will be less pollution and discharge of polluting substances or chemicals.

Hazardous waste substances like oil, gas, ammonia and other chemical materials should not be disposed on earth surface as they are likely to seep into the ground. The best thing to do is to collaborate with environmental activists or groups in the environment to provide help and make the planet earth environmentally friendly (Pranjali, 2015). Therefore, going green is the right and new path to satisfy human needs, and now is the time to have ecofriendly minds and products, and to introduce certain eco-friendly techniques in every activity for each day in life to ensure that mother earth is clean and a place to sustain and live in.

It should be mentioned that mining, exploration activities and industries have caused and increased the hydrologic consequential deterioration. Burning of coals, flaring of gas and increased figure of vehicles have multiplied the degrees “of atmospheric CO, CO₂, SO₂, NO”, thereby raising atmospheric temperature. This is however, called the 'greenhouse effect'. It will further lead to global warming of which coastal or water areas are expected to be in danger of submerging.

3.1 Gas Flaring

Gas flaring refers to the process of burning-away into the atmosphere gas associated with crude oil flow from wells. Moreover, hydrocarbon processing stations, plants and refineries, also burn-off gas as a safety means to reduce oil flow pressure (Ghadyanlou & Vatani, 2015). It is globally recognized that this practice is now an environmental problem, constituting about “150 billion m³” of natural gas amount flared across the world. This pollution contaminates the green and atmospheric environments with up to “400 Mt CO₂ per year” (Andersen, Assembayev, Bilalov, Duissenov & Shutemov, 2012). Losses coming from gas flare remain the enormous loss in most industrial operations in oil-gas exploration, refinery, coal industry, chemical plants and landfills. Furthermore, losses to flaring consists, pipeline crude gases, fuel gas, process gas, steam, natural gas, and nitrogen. Flaring units are mostly installed on different places like the onshore and offshore production platforms and fields.

More so, other areas are floating petroleum storage vessels, on transport vessels and sometime in port storage facilities, a well as storage tank farms located along petroleum distribution pipelines. Gas flaring is a challenging factor to energy and constitute serious environmental problem thronging the entire world today as in case of global warming issues. This problem is likely caused due to rise in CO₂, CH₄ and other sensitive greenhouse gases (GHG) emitted into the atmosphere. However, flared gas is viewed to be similar in its composition to utmost natural gas, it is a cleaner source for energy than some commercial fossil fuels (Andersen, *et al.*, 2012). As the increase in gas prices had continued since 2005, there are growing concerns now about the looming scarcity of oil and gas resources. However, having interest in flaring of gas has rapidly increased causing larger volume of gas been wasted. For instance, the volume of gas being flared can provide about 50 % of Africa's electricity or energy needs (Andersen, *et al.*, 2012). Therefore, saving energy and lowering emissions have become the global need for every society. More so, eliminating gas flaring and increasing its utilization is a required contribution to providing energy efficiently, thereby mitigating issues of climate change (Deo, Gupta, Asija, Kumar and Rai, 2010).

The burning of natural gas is with the excuse that it cannot be converted or processed for domestic use or commercial sale due to some technological or economic factors. Gas flaring comes with some combustion devices made to safely or properly destroy unwanted gases generated during normal crude oil production and storage operations. It often comes from variety of sources like gas from crude oil flow, gas plants, crude well-tests and other crude oil storage facilities. It is diverted through pipeline headers and transported to a flare unit for acclaimed safe disposal. A flare disposing unit has multiple outlets for flares to handle the wastage gases (Sangsaraki, and Anajafi, 2015). Gas flaring processes often take place on top of standing huge pipe burning gases making visible the flame. Height of the pipe diffusing the flame depends on the amount of gas released, while its color and brightness depend on the gas composition. Gas flaring units are basically installed at offshore and onshore platforms of crude oil production, as well as on transport vessels, port facilities, storage tank farms and pipelines distribution channels. However, a complete flare unit can include flare boom or stacks and pipes that usually carry the gas to the burning flame. The flare top stack is designed to help allow air into the flame to improve or raise the burning efficiently. Seals are installed at the stack to prevent a flashback from the flame, and a vessel on the base of the boom removes and conserves the liquids from gas passes into the flare.

The flare is usually visible with flames that generates both heat and noise. During flaring, water vapour, hydrocarbon liquids and CO₂ is being released in the air. Furthermore, Flaring is categorized into three segments: “emergency flaring, process flaring and production flaring” (Senes, 2012). Emergency flaring do happen during fire outbreak, breakage of valves, or compressor unit failures. Process flaring takes place during petrochemical processes where some waste gas is isolated from production flow line which then is flared. Production flaring also occur during oil and gas exploration activities in the production sector of the industry.

3.2 Environmental impacts of Gas Flare

Gas flaring is posing a threat to energy and the environment. It is a serious problem facing the entire world today. The environmental challenges and consequences related to gas flaring have certain devastating effect on the local population, which leads to severe health problems. Therefore, the technology available to address the gas flaring issues exists today, while the policy regulations and legislations required to be put in place. The climate warming impact is obvious, contributing to increase in global gas hydrocarbon emissions. There is the release of about 45.8 billion kW of flared heat into the atmosphere of Niger Delta region from flared gas on daily basis (Abdulkakeem & Chinevu, 2014). As a result of gas flaring, temperatures are raised in the environment, which has rendered most areas uninhabitable. The CO₂ emitted from gas flaring have increased global warming problem and has contributed to variations in climate change.

Gas flaring constitutes a major environmental problem due to its significant impacts associated with several harmful elements. The degree of impact lies on the volume of gas and the gas composition (Gzar, & Kseer, 2009). The impacts of gas flare emitted consist as follows:

- i. high impurities and several toxic particles into the air,
- ii. harmful elements on human health and the ecosystems.
- iii. hazardous in the atmosphere when present in high amounts,
- iv. corrosive in contact with water,
- v. causes acidic rain in the atmosphere to the environment,
- vi. destruction of crops, house roofs and impact on human health,
- vii. causes reduction in oxygen level which may lead to death,
- viii. causes respiratory system damage, inflammation and lung cancer.

4.0 Gas flaring reduction and recovery

Environmental protection reasons and economic advantage have opened the opportunity for the recovery of gas through gas flare recovery process to reduce the level of gas allowed to waste through flaring (Duck, 2011). The recovery system of flared gas helps to minimize noise, heat, radiation, maintenance and operating expenses, air pollution, gas emission and reduction of hydrocarbon particles in the atmosphere, as well as steam consumption. In recent times, there is international advocacy to reduce the rate of gas flaring or venting via World Bank programme, of “global gas flaring reduction partnership and the global methane initiative” (Johnson & Coderre, 2012). Most countries have been made signatories on this partnership for voluntary standard toward reduction of gas flaring and venting, and countries in the partnership have actively promoted and demonstrated the will to reduce flaring and venting (Johnson and Coderre, 2012). In their regulations, there is the enforcement to reduce gas flaring such that it directly regulates an enforced policy on zero flaring. In addition, the United Nations’ “Clean Development Mechanism” offers ‘Certified Emissions Reductions’ by providing gas flaring and gas venting reduction programme.

Certain steps can be of help to reduce gas flare and gas losses, this include optimal operation and proper maintenance of the gas flaring units, modify the start-up and shut-down processes. In addition, elimination of valve leakages, timely use of required fuel gas for timely activity of gas flare as well as proper control of heat and steam to realize smoke free flaring to reduce losses. Recovery methods can also minimize environmental pollution and economic wastes associated with burning off of gas. In recent time, new technologies in flare tip design provides massive minimization in gas flare loss (Duck, 2011). Most developed countries are using the new methods to prevent gas losses in refineries to reduce wastes. The countries active are “USA, Italy, the Netherlands, and Switzerland”. Most of these countries have installed the systems that prevent gas flaring based on environmental and economic reasons, where the payback time to partners on such equipment were considerable enough to complete the capital cost. The systems were operationalized to extract barely all of the waste gases to some extent. However, there is global interest to reduce gas flaring not

just because of economic reasons, but for environmental challenges it poses to people (Peterson, Cooper and Baukal, 2007).

Green technology also involves gas to liquid technology which is a means for eliminating gas flaring in oil and gas industrial environment. More so, it is one essential issue in the energy industry. By the converting flare gas into bottled gas, there are economic benefits which enables controlling waste gas into environmentally friendly fuels. Gas to liquid technology plays an interesting role for the delivering of gas to local and international markets as gaseous chemicals (Iandoli, and Kjelstrup, 2007). This kind of product has interesting environmental gains. Therefore, the converting of gas to synthetic fuel has encouraged more countries to invest into it for economic and environmental advantages involved.

4.1 Advocate for Green Technology in Nigeria

According to Thisday Newspaper, as was reported by (Addeh, Emmanuel, on 21st June 2021), the Managing Director of Clenik Petrotech Solutions, Clara Ikuku, deeply advocated for the utilization of eco-friendly technology in the oil and gas industry of Nigeria to bring to an end the intensive gas flaring ongoing across Niger Delta oil rich environment and the sea beyond, of which there is half incessant and enormous loss of hydrocarbon molecules. As a geologist and competent reservoir engineer, her argument is green technology has effectively been applied across the Basins in Texas successfully, and there is zero gas flare in the Basins. Ikuku further argue that a country like Nigeria with much deposit of oil and gas has more to benefit from using its rich gas resources to generate more revenue and would have the opportunity of protecting the people and environment habouring the industry. Furthermore, her argument is that green technology is a game changer that can promote gas energy programme.

Clara Ikuku asserts that time has come to end gas flaring in Nigeria because the gas is needed to develop and improve our shaky economy and to provide hope for unborn or future generation. However, are claim being that green technology can ensure sustainable development and environmental protection for all people. She orchestrated that it is no longer business as usual, as big banks and other financial institutions are moving away their money out of the oil industry because they are passionate that the environment is being polluted and the impacts of global warming is now hurting the globe. Therefore, efforts can be geared up make these stakeholders and big banks to understand that there is chances of still producing the oil safely without pollution to the environment through zero gas flares, thereby we can achieve the investment sincerely desired for the good of all.

Insightfully, Clara Ikuku observed that a Canadian based high tech-company in Houston, is currently partnering with eco-friendly technology which also has successfully applied green technology at one of the oil terminals in Appalachian Basin located in U.S. Explaining how green technology systems works, Clara Ikuku affirmed that it is the most reliable methods to ensure clean energy for people and to prevent hazards related with the release of carbon. Further, the gas, once the well is completed moves gas together with water from the well into the pipeline. Further, there are lots of separators at the completed well site, therefore, the separators can separate the gas and water constituents apart. The oil can be extracted and sold, while the gas can be compressed and reinjected if they so want, in order to manage the reservoir to maintain the pressure in the reservoir. She revealed further that the company, which consults for Saudi Aramco in Texas U.S.A. is preparing to initiate a discussion with stakeholders involved in gas to energy (power) programme and the Nigerian National Petroleum Corporation (NNPC) on how benefiting deploying green technology can be in Nigeria.

4.2 Theoretical framework

Innovation Diffusion Theory (IDT)

Innovation Diffusion Theory was propounded by Rogers in 1962. It is a social sciences theory that study any form of innovations. This theory came as a result of other diffusion studies that emerged since 1950s and

centers on individuals' differences of innovations. Rogers (2003) proposed four main factors which determines behavior, innovation, communication channels, time and social systems. The terms diffusion, innovation, communication was explained as follows: diffusion is the process by which innovation communicated via certain channels to members of a social system. Innovation is the idea or practice that is perceived by any individual. Communication is a process of sharing useful information with others as to have a common understanding. Rogers further stated that innovation attributes that can affect people's behavior exists, and the rate of adoption of innovation. These attributes are relative advantage, compatibility, trial ability and observability. For application innovation diffusion theory in eco-friendly technology, it is a good idea for green technology adoption, evaluation and implementation.

5.0 Methodology

The study employed descriptive research design to elicit data from relevant secondary sources to ascertain the importance of employee learning in use of eco-friendly technology in oil and gas through secondary sources. This approach provided necessary tabloid to evaluate the objectives of the study.

5.1 Findings

In view of the foregoing, the findings of this study show that there were no data in compliance of eco-friendly technologies by oil and gas producing companies in Nigeria. This reveals further that non-compliance to the use of eco-friendly technology in oil and gas exploration activities has increased the rate of gas flaring in an immeasurable level. This entails that lots of gases are being flared contributing to the impact of global warming and contamination of the atmosphere which directly affect vulnerable populations. It also reveals that employee training is significant to the use of eco-friendly technology in the elimination of gas flare in oil and gas exploration activities when adopted by oil companies in the country.

5.2 Conclusions

Gas flaring is evidently one of the critical environmental problems overtime, due to greenhouse gases and hydrocarbon emissions. These destructive emissions stand as a high global warming potential and adversely contributed to heat waves and climate change. Flare gas reduction and recovery is a high priority for sustainable development. This can provide environmental and economic surplus advantages. Therefore, gas collection, compression and export to local and international markets through pipelines and bottling for sale is a known-established and satisfactory approach to mitigating and reducing gas flaring and venting.

Recommendations

The study recommends as follows:

- (i) Companies in oil and gas exploration activities in Nigeria should interface with other international experts and partners to acquire eco-friendly equipment and systems for oil and gas production activities.
- (ii) Government should legislate mandatory regulations and supports that can enable oil and gas companies to comply with the use of eco-friendly technologies in oil and gas industry in Nigeria.
- (iii) Government should compel oil and gas companies to convert liquid gases to bottled gas for domestic use and export.

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