

# **CHAPTER ONE INTRODUCTION**

# 1. INTRODUCTION

The oil industry is a new one in Sudan and plays a vital and important role in increasing the GDP (gross domestic product). This industry has its clear **impact** on economic and social conditions. In spite of economic and social benefits; there are a number of environmental and social impacts.

Petroleum in an unrefined state has been utilized by humans for over 5000 years. Oil in general has been used since early human history to keep fires ablaze, and in warfare. Its importance to the world economy evolved slowly, with whale oil used for lighting in the 19th century and wood and coal used for heating and cooking well into the 20th century. The Industrial Revolution generated an increasing need for energy which was met mainly by coal, and with other sources including whale oil. However, when it was discovered that kerosene could be extracted from crude oil and used as a lighting and heating fuel, petroleum was in great demand, and by the early twentieth century had become the most valuable commodity traded on world markets. The history of oil and its career during the twentieth century the entire world of flooding events are closely linked to conflict. Oil is the most important topic in the contemporary world politically, economically and will always **be** Petroleum word in the world's conflicts and economic **policies** has succeeded for its unique characteristics to conquer the world and control it. **Human** control over the oil in its primitive stages for use **when** the oil industry developed and opened **its** global markets becomes prisoners in human needs and requirements subject to the Petroleum.

Petroleum is a mixture of a very large number of different hydrocarbons; the most commonly found molecules are alkanes (paraffin's), cycloalkanes (naphthenes), aromatic hydrocarbons, or more complicated chemicals like asphaltenes. Each petroleum variety has a unique mix of molecules, which define its physical and chemical properties, like color and viscosity, crude oils are compounds that mainly consist of many different hydrocarbon compounds that vary in appearance and composition. Average crude oil composition is 84% carbon, 14% hydrogen, 1%-3% sulphur, and less than 1% each of nitrogen, oxygen, metals and salts. Crude oils are distinguished as sweet or sour, depending upon the sulphur content present. Crude oils with a high sulfur content, which may be in the form hydrogen sulphides, are called sour, and those with less sulphur are called sweet, the properties of these hydrocarbons depend on the number and arrangement of the carbon and hydrogen atoms in their molecules, The basic hydrocarbon molecule is 1 carbon atom linked with 4 hydrogen atoms (methane). All other variations of petroleum hydrocarbons evolve from this molecule hydrocarbon containing up to 4 carbon atoms are usually gases: those with 5 to 19 carbon atoms are usually liquid and those with 20 or more are solids. In addition to hydrocarbons crude oils and natural gases contain sculpture nitrogen and oxygen compounds together with trace quantities of metals and other. Crude oil is believed to have been formed over millions of years by the decay of vegetation and marine organisms compressed

under the weight of sedimentation because oil and gas are lighter than water they rose up to fill the voids in these overlying formations .this upward movement stopped when the oil and gas reached dens overlying impervious strata or nonporous rock , The oil filled the spaces in porous rock seams and natural underground reservoirs, such as saturated sands, with the lighter gas on top of the heavier oil .these spaces were originally horizontal, but shifting of the earth's crust created pockets, called faults, anticlines, salt domes and stratigraphic traps, where the oil collected in reservoirs, the name of crude oil often identify both the type of crude and areas where they were originally discovered .for example the first commercial crude oil, Pennsylvania crude is named after its place of origin in the United States other example are Saudi light and Venezuelan Heavy. Two benchmark crudes used to set world crude prices are Texas Light Sweet and North Sea Brent ([www.wikipedia](http://www.wikipedia)).

Divided dangerous areas in the oil industry on the basis of two factors the frequency or the expectation of a mixture of flammable gases or explosive and the long survival of a mixture of gases, flammable or explosive all at once, according to the above concept divided Germany and European countries hazardous areas into three zones: (Zone 0): is defined as the area where gaseous mixture of flammable or on an ongoing basis is relatively long. (Zone 1): is defined as the area that is likely to exist where the gaseous mixture is flammable at normal operating conditions. (Zone 2): is defined as the area that it is unlikely that there is a gaseous mixture is flammable at normal operating conditions, and that has happened and found such a gaseous mixture that would be for a very short period ([muhammadknol.wordpress.com](http://muhammadknol.wordpress.com)).

For each industry objectives aspiring to join it and working hard through development and training and the application of quality standards and management systems of occupational safety and security among these departments, but most industry must achieve its goals because the failure to achieve its goals means failure to secure working environment and to provide a safe working environment of different risks raise the level of competence and means of prevention would undoubtedly lead to a reduction of injuries and occupational diseases, and protect workers and then reduce the number Working hours lost due to absences due to illness or injury, as well as reduce the costs of treatment and rehabilitation and compensation for occupational diseases and injuries and material losses which will reflect on the **improvement** and **increase of the** level of production and the economic power of the State , it is clearly noted in the high rates of injures, accidents and risks which are closely related to this industry, these risks can be electrical , chemical and physical, deepening on risks **on the oil** industry in the light of the development processes and the growing demand for the use of oil for the needs of primary energy as **petroleum products** and natural gas so that it came out that oil was providing more than 90% of the needs of some countries, especially densely populated, in addition to the importance and the role of oil as the mainstay source of national income in many producing countries, which has increased public

awareness of the need to protect the environment and human and especially those working in the oil industry of the risks (www.hrdiscussion.com).

It is so important to pay real attention to the issue of safety in the oil installations special attention to reduce the rates of occupational injuries and diseases.

Occupational accidents in oil industry are not only causing the injuries or casualties but also a huge amount of economic loss. Approximately 4% of the GDP (gross domestic product) of the world as a whole is lost due to occupational accidents and diseases this means loss of 1.25 trillion U.S. dollar annually. For example, the cost of the occupational accidents and diseases is 5-10 % of the total income of British(Leigh, et al., 2006) companies **direct** costs (medical, legal, administrative), worker's compensations property damages, lost earnings, and lost benefits are typically considered as economic impacts of occupational injuries. However, there are also a number of less obvious indirect costs that substantially contribute to the overall loss. In fact, for every one unit of direct costs an estimated 3 to 5 unit of indirect costs is also incurred. Thus, the cost to individuals and industry from occupational injury and fatality is very huge. The indirect costs associated with workplace injuries are often not taken into account when assessing the monetary impact of a workplace injury or fatality. Direct costs can be described as the costs including actual money spent on medical expenses, health care, property damages, police and fire services, and legal and administrative expenses for insurance and workers' compensation (Leigh, et al., 1996).**Occupational Health and Safety OHSAS18000** is one of Administrative regulations that deal with the issues of Occupational Safety and Health in the industrial and service sectors and aims to provide safer, more tranquil and healthier working environment to the **labores**. Occupational health and safety service are **regarded** as a part of the fundamental aspect of the economic development of nation. The success of these services is measured in terms of the level of health and safety status of employee. The level is reflected by the number of occupational injuries, occupational disease, losses incurred through property, damage, loss of production, process and even profit in industry. All these factors form the foundation of essential economic base OSH is key social protection. Promoting the safety and health of workers has been a **shared** responsibility of ministry of human resource development and labor in partnership with ministry of health (Benjamin o.alli, 2008 ). The OHSAS 18000 is an internationally accepted specification that defines the requirements for establishing, implementing and operating an OH&S Management System the OHSAS 18000 series is the emerging standard set occupational safety and health. It consists of the OHSAS 18001 and the OHSAS 18002 Guidelines for the implementation of OHSAS 18001, the generic name given to a family of international standards developed to provide a framework around which an occupational health and safety management system can effectively be implemented (UNMAS), 2001),The objectives of the OHSAS to be achieved, to protect the human element of the risk of injuries the work environment and preventing exposure to accidents and occupational injuries and diseases, maintain elements of the physical element of the

facilities and what they contain equipment Damage and loss as a result of accidents providing and implementing all the requirements of occupational safety and health to ensure that the provision of a secure environment achieved prevention the risks of human and physical elements. There are many reasons for organizations to decide to implement an occupational health and safety management system, not least the reduced risk of failing to comply with legislation. a systematic approach to the effective management of health and safety can bring numerous benefits such as, reducing the number of personnel injuries through prevention and control of workplace hazards reducing the risk of major accidents, Ensuring a well-qualified and enthusiastic workforce by fulfillment of the increasing expectations of your employees. Reducing the loss of materials caused by accidents and in production interruptions. Reducing cost of insurance as well as reducing costs due to absence of employees. Serving the possibility for an integrated management system including quality environment and health and safety, ensuring that appropriate legislation is addressed and acted upon(<http://www.dnvcert.com>) , a companywide training and awareness program was launched that emphasized company safety and each employee's responsibility with respect to safety, as well as the consequences of not following procedures. The training program was expanded to include new-employee orientation and periodic refresher training on major issues such as safe working practices, company evacuation, and accident and/or injury reporting and corrective measures. A quarterly management review was established to instill a higher level of management commitment to and awareness of the implementation process, and to develop communication channels for continual improvement and support of the system following the registration audit.

## 1. 2 RESEARCH PROBLEM

This study is to determine how far the established organization will successfully go in the application of the OHSAS 18000 and thus reduce occupational injuries and diseases, the economic and social impact associated with environmental constraints and problems of application. To examine the benefits, difficulties and applicability of OHSAS 18000 Series of Standards in oil industry. The study evaluates these series in a comparative scope. The application given in the thesis aims to increase the quality of products and to provide safer work environment. In the other hand a risk assessment is an important step in the protection of workers, as well as compliance with legal regulations. It helps to focus on the elimination or reduction of risks in the workplace - which can cause real harm. The important questions the study tried to answer is there any relationship between reducing waste of resources, accidents and injuries and the application of the system OHSAS 18000.

### **1.3 RESEARCH OBJECTIVE**

To evaluate the impact of the application of OHSAS 18000 in the oil industry in Sudan so as to encourage all the organization in oil industry to adopt occupational safety and health management system.

The weakness of OHSAS culture, cost control and quality, in face of global change, and the economics of free market added new burden over **the organization** to improve its performance with aim of gaining competition. Numerous organizations needed to obtain qualification certificate, but they have not fulfill occupational safety and health OHSAS **requirements to try to** determine how the company's will go successfully in implementing the requirements of OHSAS 18000 **system**. To what extent we can implement OHSAS 18000 in facilities operating in Sudan 18000? Extent of compliance with laws and legislation of Occupational Safety and Health in the Sudan and the international lender evaluate the effectiveness of the OHSAS 18000 system In spite of existing legislation in occupational safety and health (OHSAS) but the researcher observed how much weakness of institution of occupational safety and health (OHSAS) whether in public or private sectors despite of swift development on industries or service sectors.

#### **1.1.4 RESEARCH HYPOTHESIS**

H<sub>1</sub>= There is a positive relationship between reducing waste of resources, accidents and injuries and the application of the system OHSAS 18000 and the impact on the financial.

H<sub>2</sub>= There is a relationship between the overall objectives with regard to occupational safety and health and the application OHSAS 18000.

H<sub>3</sub>= Safety oriented work force is positive factor for organization safety performance.

H<sub>4</sub> = The close relation connection between efficient safety management and organization performance.

**CHAPTER TWO**  
**LITERATURE REVIEW**

Occupational Safety and Health importance applied in any industrial sector is not only the pride of the stems, but it's important in preserving the life and health of employees and also economic interest at the applicable system for the sector. The losses arising from the lack of attention to the application is greater than the value applied, also for competitive advantage via demonstration of commitment to health and safety, In research conducted by the Lincoln Nebraska Safety Council in 1981, the following conclusions were based on a comparison of responses from a survey of 143 USA national companies. All conclusions have a 95% or more confidence level. Table 1.1 is an abstraction of results from that study.

Table 1.1: Effectiveness of Safety and Health Program Findings (Reese and Eidson 2006)

<b>Statement</b>	<b>Findings</b>
Do not have separate budget for safety.	43 % more accidents*
No training for new hires.	52 % more accidents
No outside sources for safety training.	59 % more accidents
No specific training for supervisors.	62 % more accidents
Do not conduct safety inspections.	40 % more accidents
No written safety program compared with companies that have written programs.	106 % more accidents
Those using canned programs, not self-generated.	43 % more accidents
No employee safety committees.	74 % more accidents
No membership in professional safety organizations.	64 % more accidents
No established system to recognize safety accomplishments.	81 % more accidents
Did not document / review accident reports, and reviewers did not have safety as part of their job responsibility.	122 % more accidents
Did not hold supervisor accountable for safety through merit salary revives.	39 % more accidents
Top management did not actively promote safety awareness.	470 % more accidents

**\*More accidents compared with companies applied system for safety.**

From above table, and the results obtained from the researches on companies to find the relationship between the company's interest in occupational health and safety and the number of incidents has the highest rate of accidents in companies that did not apply the system for safety and has no documentation of accidents and injuries, and shows the most important reason for the lack of interest and commitment from top management to publish safety culture and the adoption of a system to inform their employees of the importance of safety in the performance



of work and its impact on their performance the success of the company is to find effective controls to counter the risk consistent with the policy and objectives of the Occupational Safety and Health have. Keen business organizations to increased power with the laws regarding the affairs of occupational health and safety and secure work environment. To follow economic policies that are interested in supporting activities related to safety and occupational health, and other actions and decisions in support of these activities, and the growing interest of the parties concerned with occupational health and safety in general, so we find that the impact of interest in occupational safety and health have a role in the preservation of resources and lack of waste.

## 2.1. A Legislation of occupational safety and health

Work health and safety regulation, law and enforcement, as well as other compliance support activities or regulators are among the factors that may contribute to regulate wellness and capacity(Lindblam ;2006). According to Lindblam (2006) there is good evidence that the achievement of social goals such as preventing work related death, injuries and illness is higher when law exist, effectively communicate, and compliance is inspected and enforced. Ministry of human recourses development and labor is responsible of issuing enforcement and implementing of occupational safety and health OSH legislations and standards in Sudan Lab our law; This law **consigned eleven** chapter for occupational safety and health {industrial safety} which involving 24 article as general frame for occupational safety and health so it defines assignments and responsibilities of workers and work owners in addition to legal frames of safety inspection and safety inspector propriety. Most important article is [95] which **is** stipulating that every owner of factory contains not more than 300 worker, not less than 150 worker must appoints unconsecrated safety officer {not full-time}, and if the number is more than 150 worker and less than 500 he must **appoint** consecrated safety officer {full-time} but if the number increase than 500 worker he **must form** safety committee under the factory manager chairmanship (labour Act 1997).Factories regulation1981; contains articles related to precaution against fire and dangerous materials as well as protection of residential areas safeguarding against mechanical hazards involving boilers in addition to winches and care of general materials (Factories regulation1981).Occupational health regulation1981; involving stipulations of health in factories and industrial process as well as stipulations of work environment– lighting – humidity, lead processes, periodical medical detection and first relieving in addition to work owner responsibility(Factories regulation occupational health1981) . Compensating Act of work injuries 1981; involves materials relating to injuries and compensating of injuries in addition to many stipulations relating to contractors and subcontractors commitments (Compensation Act of work injuries, 1981).

The above is a short presentation of the legislations **governing** the occupational safety and health.

Any industrial organization must have its own rules and regulations that apply to the various activities in that organization. The petroleum industry being a danger prone industry must certainly have such rules and regulations, Such rules will cover methods of company start up and operation, maintenance practices, inspection of the company, driving of vehicles inside the company, lifting of equipment, disposal of waste, etc, In most of these regulations safe practices are of importance and must be included. It is the duty of the safety department to initiate such rules or when drafted by other departments to take part in the drafting. The sum total of past experience in this field is often found in safety recommendation of scientific institutes and societies and insurance requirements of the oil industry and of industry in general. Such rules and recommendations have however to be tailored to fit the social background of the work force, their skill, the weather, the local laws and many other factors. So a safety department in any oil **industry must** have its own set of rules and regulations and must classify them as mandatory or advisory. Such rules should be subject to constant and periodic revisions and updating in view of accumulated experience.

## **2.2 OHSAS 18000 Occupational Healths and Safety Assessment System**

In recent years, the quality, health and safety requirements in many countries **have become** more stringent. Pressures have led to the enacting of new safety legislation and safety standards. Many organizations in America, Europe and Asia Pacific regions have adopted safety management practices to control hazards and risks better and to resolve workplace problems and accidents. These safety management practices may vary with the types of organization and the stages of organizational development. It is argued that safety management practices help organizations to manage health and safety risks, and comply with health and safety legislation, occupational safety and health can be important for moral, legal, and financial reasons. All organizations have a duty of care to ensure that employees and any other person who may be affected by the companies undertaking remain safe at all times. Moral obligations would involve the protection of employee's lives and health. Legal reasons for OSH practices relate to the preventative, punitive and compensatory effects of laws that protect worker's safety and health. OSH can also reduce employee injury and illness related costs, including medical care, sick leave and disability benefit costs .

There are several systems to maintain occupational health and safety that can be adopted **and applied an organization to** maintain the safety of employees, including OHSAS, British Standards Institute published an occupational health and safety management system standard (BS 8800) which provides general guidance for developing a health and safety management system in 1996.

It is based mainly on the ISO 14001 Environmental Management Systems model, and BS 8800 provided general guidance for developing a health and safety management system. After that, the British Standards Institution expanded 8800 into the OHSAS 18000. The OHSAS 18001, as a separate document, specifically provides employers with requirements for their health and safety management systems against which a third-party registrar can assess and certify them (Seivold, 2002). It was developed in response to urgent demand for a recognized standard against which occupational safety management systems can be assessed. It is compatible with ISO 9001 and ISO 14001. It covers issues such as planning for hazard identification, risk assessment/control, OHS management, awareness and competence, training, communication, emergency preparedness and response, performance measuring and improvement, specifies requirements for an OH&S management system to enable an organization to develop and implement a policy and objectives which take into account legal requirements and information about OH&S risks, it is intended to apply to all types and sizes of organizations and to accommodate diverse geographical, cultural and social conditions. The success of the system depends on commitment from all levels and functions of the organization, and especially from top management. A system of this kind enables an organization to develop an OH&S policy, establish objectives and processes to achieve the policy commitments, take action as needed to improve its performance and demonstrate the conformity of the system to the requirements of OHSAS 18001. OHSAS 18000 is an international occupational health and safety management system specification. It comprises two parts, 18001 and 18002. It is intended to help organizations to control occupational health and safety risks. It was developed in response to widespread demand for a recognized standard against which to be certified and assessed. **Organizations** of all kinds are increasingly concerned with achieving and demonstrating sound occupational health and safety (OH&S) performance by controlling their OH&S risks, consistent with their OH&S policy and objectives. The main focus in occupational safety and health OSH is on three objectives, Maintenance and promotion of workers health and working capacity, Improvement of working environment and work to be conducive for safety and health, Development of work organizations and working culture in a direction which supports health and safety at work and doing so also promotes **apositive** social climate and smooth operation and may enhance productivity of under taking. **To comply** with and become registered to OHSAS 18000 / OHSAS 18001 the organization must:

- a. Determine the health and safety hazards and risks associated with its operations.
- b. Identify health / safety laws / regulations pertinent to its operations;
- c. Design and implement controls to eliminate or at least manage health / safety hazards / risks.

- d. Establish improvement programs and set targets, goals, and measurement methods to track the effectiveness of the controls.

The organization must also establish and communicate its health / safety policy, maintain records, internally audit its 18000 system, ensure affected employees are competent through training or other means, submit the system and its status and results to regular management review, and appropriately document the system([www.kantnercompany.com/aa18001](http://www.kantnercompany.com/aa18001)).

Many organizations have undertaken OH&S “reviews” or “audits” to assess their OH&S performance. On their own however, these “reviews” and “audits” may not be sufficient to provide an organization with the assurance that its performance not only meets, but will continue to meet, its legal and policy requirements to be effective, they need to be conducted within a structured management system that is integrated within the organization. The OHSAS standards covering OH&S management are intended to provide organizations with the elements of an effective OH&S management system that can be integrated with other management requirements and help organizations achieve OH&S and economic objectives. These standards, like other International Standards, are not intended to be used to create non-tariff trade barriers or to increase or change an organization's legal obligations. OHSAS Standard is based on the methodology known as Plan-Do-Check-Act (PDCA) **Deming** can be briefly described as follows:

**Plan:** establish the objectives and processes necessary to deliver results in accordance with the organization's OH&S policy

**Do:** implement the processes

**Check:** monitor and measure processes against OH&S policy, objectives, legal and other requirements, and report the results.

**Act:** take actions to continually improve OH&S performance.

Many organizations manage their operations via the application of a system of processes and their interactions, which can be referred to as the “process approach”. ISO 9001 promotes the use of the process approach. Since PDCA can be applied to all processes, the two methodologies are considered to be compatible(OHSAS). The overall aim of OHSAS 18001 is to support and promote good OH&S practices, including self regulation, in balance with socio-economic needs. It should be noted that many of the requirements can be addressed concurrently or revisited at any time it covers issues such as:

- a. Planning for hazard identification.
- b. Risk assessment/control.

- c. OHSAS, management, awareness and competence, training, communication, emergency preparedness and response, performance measuring and improvement.

All documents in OHSAS 18001 and data containing information critical to the operation of the OH&S Management System and the performance of the organization's OH&S activities should be identified and controlled. Documents should be properly updated, valid, clearly identified, and easily traced for the effective management execution. Every document should be able to reflect work conditions, and duly evaluated by the approving authority. Document compilation, preservation, revision, and retraction should be suit time and place. A documented system which describes responsibilities, procedures, forms and Instructions to manage and we ensure that these are always up to date and accessible by those who need to use them, documents, including records, required by this OHSAS Standard and It is important that documentation is proportional to the level of complexity, hazards and risks concerned and is kept to the minimum required for effectiveness and efficiency. OHSAS 18001 does not have many "documentation procedures"; but whatever circumstances are, aside from the procedure, the factory should define the criteria for support based on its requirements (Wen, Ching and Hun ,2002).

OH&S records with details appropriate to the needs of the organization should be established, managed, and maintained locally. The records should contain appropriate information regarding national OH&S laws and regulation, the OHSMS itself, as well as monitoring data regarding elements such as workers health and exposure, ambient working environment, work-related injuries, ill health, diseases, incidents, training programs and lists of trainees (IFC, 2003).

OHSAS 18001 does not have many documentation procedures, document process procedure for manager ensures the rights employees are produced review & approval for key users review the document to ensure it is complete and appropriate relevant manager signs approval for release ,communication & distribution for manager ensures new documents are communicated to those affected and approved copies are made available to all relevant employees and other users (e.g. contractors, suppliers, customers).document review & updating, documents are reviewed at least 2 yearly or whenever a process or legal change occurs. Modified documents go through the review and approval process.

Document control register shall be maintained for all system documentation created or modified, the master OHSAS document control register will include the following:

- a. Document Title
- b. Version Number
- c. Date Created
- d. Date Reviewed
- e. Reasons/Comments for creation/review

f. Document Custodian

Documentation developed or modified locally by units and centers as part of the OHSAS system shall be recorded on a local OHSAS document control register and maintained.

The policy statement in OHSAS should be appropriate for the size and nature of the organization. The organization should, through a policy statement, be committed to protect the health of all employees, Comply with relevant national and international OHSAS requirements, Ensure consultation with and active participation of the workers, continuously seek to improve the performance of the OHSAS system.

The manual in OHSAS18001 should include: OHS Policy, OHS organization and allocation of responsibilities, schedules, procedures, instructions and other internal documents used for OHS management and control. There should be a section identifying key risks and hazards arising from the organization's activities together with arrangements for their prevention and control, the manual should establish procedures, schedules and methodologies for review of safety and control features, as well as plans and schedules for monitoring ambient working environment quality and individual exposure levels as appropriate

- a. All OH&S systems procedures
- b. Any forms or drawings
- c. Any working instructions/operational procedures.
- d. The following aspects of documentation control can often be found on some of the most effective systems:
  - e. Issue and revision date
  - f. Effective date
  - g. Approval signature
  - h. Revision number
  - i. Documentation number (or other identifier)
  - j. Copy number
  - k. Cross -references.

In implementations of Health and Safety Management System the top management should take the ultimate responsibility for OH&S and the OH&S management system. It should ensure the availability of resources (including human resource, organizational structure, and technology, financial resources essential to establish, implement, maintain and improve the OH&S management system. Top management should also define roles; allocate responsibilities and accountabilities, and delegating authorities. The organization should appoint members of top management with specific responsibility for OH&S. These members have to ensure that OH&S management system is established. The employer is responsible for planning, implementing and monitoring programs and systems required to ensure OHS on its premises. The following steps form the basic structure of the management system and link into the Structure of OHSAS 1800 :

## 1. Planning

During the planning stage we should:

- a. Ensure we have the commitment of top management.
- b. Define, with the authorization of top management, the company's occupational health and safety policy.
- c. Planning must be completed to establish a framework for identifying hazards, the assessment of risks and the implementation of necessary control measures.

Legal obligations must be identified and understood, objectives set and a management programme for achieving them implemented. This entire process should be documented

- a. defining and communicating of roles, responsibility, accountabilities and authorities,
- b. training of employees whose work can be associated with occupational health and safety risks,
- c. communication of the occupational health and safety policy, objectives and targets, and other elements of the system to employees and contractors,
- d. identifying and describing of the core elements of the occupational health and safety management system,
- e. controlling of the management system documents and procedures,
- f. maintaining of documented procedures to control operations that could associate with occupational health and safety risks
- g. Establishing of an effective emergency preparedness and response plan.
- h. Planning must be completed to establish a framework for identifying hazards, the assessment of risks and the implementation of necessary control measures.
- i. Legal obligations must be identified and understood, objectives set and a management programme for achieving them implemented. This entire process should be documented
- j. Auditing and assessing the performance of the management system.

Performing management reviews of the system at identified and defined intervals checking the management system and taking any necessary corrective action by:

- a. Introducing performance, measuring and monitoring practices.
- b. Establishing and documenting responsibility and authority for accidents, incidents, non-conformities and corrective & preventative action.
- c. Establishing a procedure for records and records management.
- d. Auditing and assessing the performance of the management system.
- e. Performing management reviews of the system at identified and defined intervals.

A successful management system should be based on an occupational health and safety policy appropriate for the company, Identification of occupational

health and safety risks and legal requirements. Objectives, targets, and programs that ensure continual improvements, Management activities that control the occupational health and safety risks. Monitoring of the occupational health and safety system performance. Continual reviews, evaluation, and improvement of the system ([www.dnvba.com/US/certification/management](http://www.dnvba.com/US/certification/management)).

The OHSAS 18002 seeks to explain the underlying principles of the OHSAS18001 It describes the intent, typical inputs processes and typical outputs, against each requirement of the OHSAS 18001, to aid in the understanding and implementation of the OHSAS 18001. It does not create additional requirements to those specified in the OHSAS 18001 nor does it prescribe mandatory approaches to the implementation of the OHSAS 18001, Is published by the British Standards Institute as Occupational Health and Safety Management Systems Guidelines to assist in the implementation of OHSAS 18001. The OHSAS 18002 states that it imposes no requirements which are additional to those imposed by the OHSAS 18001. OHSAS 18002 is a much more detailed document than OHSAS 18001. However, it follows exactly the same structure as OHSAS 18001 and uses the same numbering for clauses and sub-clauses.

Within each sub-clause, the same format is used as follows:  
OHSAS18001 requirements: This is a reprint of the relevant material from OHSAS18002:

Intent: This is a general statement of what the OHSAS 18001 requirement is intended to achieve.

Typical inputs: This is a list of the inputs required for the process, or processes, needed to satisfy those OHSAS 18001 requirements which are the subject of the sub-clause under consideration.

Process: This is a description of what organisations have to do in order to meet the OHSAS requirements. In many sub-clauses there are a number of processes reflecting the complexity of particular OHSAS requirements.

Typical outputs: This is a list of the expected outputs from the process or

Processes under consideration (Guidelines for the implementation of OHSAS 18001(scope).18002-2008)

OHSAS 18002 states that it imposes no requirements which are additional to those imposed by OHSAS 18001 (<http://dspace.dial.pipex.com>):

- a. The following documents were used in the creation process of the OHSAS 18002 BS8800:1996 Guide to occupational health and safety management systems



- b. DNV Standard for Certification of Occupational Health and Safety management Systems(OHSMS,1997 )
- c. Technical Report NPR 5001: 1997 Guide to an occupational health and safety management system
- d. Draft LRQA SMS 8800 Health & safety management systems assessment criteria
- e. SGS & ISMOL ISA 2000:1997 Requirements for Safety and Health management Systems
- f. BVQI Safety Cert: Occupational Safety and Health Management Standard
- g. Draft AS/NZ 4801 Occupational health and safety management systems Specification with guidance for use .
- h. Draft BSI PAS 088 Occupational health and safety management systems
- i. UNE 81900 series of pre-standards on the Prevention of occupational risks
- j. Draft NSAI SR 320 Recommendation for an Occupational Health and Safety Management System (BSI, 2007)

## 2.3 CERTIFICATION OF OHSAS

The organizations that want to obtain OHSAS certificate **need to satisfy** all requirements of TS 18001 whether by the help of a professional assistance from consulting or not. Those consulting firms who provide assistance called as TS 18001 Occupational Health and Safety Consulting Firms. They cooperate with willing company to satisfy requirements of standards and together establish an OH&S management system. Otherwise, the organization could make a self-determination and declaration of conformance with the OHSAS specification after that, the implementation of system would start and study for detection of nonconformities would be conducted. Plan-Do-Check-Review (PDCA) cycle is followed and required revisions and improvements have to take into action. Then after, an impartial observation is performed by consulting firm.

Firstly, all documents which are asked to be provided to the certification body (OH&S Manual, Organization Scheme, etc.) are sent to certification firm. If the document examining stage is positive then after auditor of the certification body and consulting firm audit the applicant company. This certification audit can last for one week depending on the company size and facilities. After this audit, the certification can be granted if it is acceptable and it is valid for three years period.

The key steps of the OHSAS 18001 certification process include:

- a. Definition of certification scope;
- b. Pre-audit (optional); gap analysis and diagnosis of the willing organization
- c. Current position against the scheme.
- d. Initial audit to verify the implementation of the basic structure of the Management System.
- e. Certification audit (certificate issued)

- f. Surveillance audits to follow the continual improvement
- g. Re-certification after 3 years through full audit or continual assessment.

Must traffic in three stages:

First : pre-registration.

Second: the stage of registration or stage to obtain the certificate.

Third : the stage after obtaining the certificate

The certificate is granted by registration bodies dependent and associated with official bodies, both in his own country, and through hardware specifications and standards.

## **2.4 HAZARDS IN OIL INDUSTRY& RISK ASSESSMENT:**

The general characteristics of the oil and gas industry in as far as the type of dangers that exist in it as a result of its nature , its large capacity , the wide spectrum of technologies it uses and the methods that man deals with its products may be covered in the following points: In this industry we explore, drill for, produce, deal with, store, transport and process huge quantities of materials that are combustible or inflammable and in many instances are also explosive. Highly poisonous materials are sometimes encountered during some stages of the industry.

The oil and gas industry deals with these materials at elevated pressures and temperatures. In some stages of the industry, pressure and/or temperature are purposely raised. All this requires special containment vessels made from specific alloys with stringent specifications.

Such vessels must endure in service for very long periods. We must make sure of their suitability for service periodically. Maintenance and repair of such equipment when required must comply with their original specification. For these reasons and because of the high quality standards required, the initial cost as well as any repair or replacement cost of such equipment is quite high. Any maintenance work carried out must be double-checked especially for equipment handling flammable or explosive materials to ensure compliance with safe practices. This is the duty of the engineering inspection section. This series of operations starting with the metallurgical industry and terminating in maintenance represents a very complex and highly skilled piece of engineering work any error or laxity in one of the steps can generate a grave hazard that may initiate an accident with uncalculated results. In some stages of the industry, cryogenic temperatures may be employed. This requires yet very special type of alloys that will remain ductile at such depressed temperatures to avoid brittle fracture. This phenomenon has been the cause of some catastrophic accidents because of the poor quality of the metals used. What accentuates the danger here is that LNG or similar liquefied gases are handled in

the cryogenic state and their release from vessels and tank age is extremely dangerous, in many cases, crude oil is produced in the field mixed with water. Other impurities such as chlorides, H<sub>2</sub>S, naphthenic acids and other sulfur compounds are also produced. The effects of handling such materials are generally undesirable and may lead to corrosion, deterioration of equipment and eventually to their failure. Such failure will be the cause of fire or explosion in the majority of cases. The industry in some of its stages employs other materials that are used in processing the oil such as hydrogen, ammonia, caustic soda or some other complex chemicals. The effect of such materials can also lead to deterioration of metals and their failure. Their leakage to environment is also a source of grave danger. Oil and gas and oil products generally require transport over vast distances. The most common methods of transport used are pipelines mostly of large diameters and usually buried underground. Those pipelines cross rivers and lakes and even pass under the sea. They are usually operated under high pressures that generate up to 72% of the yield stress of the steel. In spite of the very high standard of safety and protection provided during design and construction, pipelines may be affected after a number of years by external factors and may fail. Such failures are a source of pollution and of fires. In the case of gas pipelines, destructive explosions are also encountered on failure. The nature of work and the processes employed in the oil industry add to the complexity of the situation and amplify the danger. The following may be noted in this concern the amount of liquids being processed that exist in the company at any given time, i.e. the liquid inventory is considerable. If any accident or mishap takes place such quantities as do exist in the company may catch fire or explode. Modern processing methods have taken this factor in consideration and tried to reduce the amount of liquids in processing vessels and equipment to the minimum compatible with the method used. But this minimum is still not little. If we bypass the processing stage to the storage side, we have to live with the huge quantities kept in tanks and although the danger of fire or explosion is far less than it was during the processing stage, the sheer volume is staggering and tank fires when they take place are one of the worst possible fires that happen in the oil industry. The various services in most of the oil production or processing installation like water, steam, compressed air, etc.... are in direct contact or near contact with the hydrocarbon fluids. In such instances any failure in one of these services will be reflected in the main process. Such a case will soon extend to the whole unit and can generate a danger or at least maloperation of the unit.

When we speak about a "processing unit" which is the usual module in the oil industry; we often find a collection of vessels, pipes, furnaces, machinery and a sophisticated control system. The failure of one instrument or piece of machinery will soon extend to a whole system. The failure of a system will more probably than not cause the failure of

the whole processing unit with the ensuring dangers that can be met. The nature of the oil industry especially in the refining sector is of the continued processing type. It does not allow the operator when failure of a part of equipment takes place but a very short time interval to correct or contain the situation. This means taking very fast decisions. The strain imposed upon the operators is strenuous and can lead in some cases to wrong decisions. This will only accentuate the inherent dangers of the industry. The sensing and monitoring elements of the control system are usually instruments of high reliability and advanced technology but such reliability is not 100% and leaves a small margin for instruments error which can lead to dangerous situations.

For all the reason mentioned above, the oil and gas industry is classified as a highly dangerous industry. It affects man and the environment in several ways. The results are injuries, sickness or even death. This is in addition to the environment damage and material losses.

Failure of equipment in the oil and gas industry because of the factors mentioned above or due to maloperation or bad maintenance will lead to one result or more of those enlisted below:

Fires and explosions that can cause partial or total damage to the company itself and may extend to damage neighboring factories or property.

- a. Injury, burns, poisoning or suffocation of operators in the oil installation or in neighborhood areas. In many cases loss of life can take place.
- b. Pollution of neighboring areas that can affect the air, water resources, agricultural land, and recreational facilities. In addition to the damage caused, the operating company may be sued by its own employees or by the affected parties. This will entail huge compensations.
- c. In the long run, the industry due to gas leakages and other causes can be the source of occupational diseases, allergies or other chronic disease. Workers in the industry or the public in neighboring areas may be affected. Huge compensations may have to be paid to the affected parties.
- d. Contamination of one oil product with another which causes deterioration of the product as well as danger. A small quantity of gasoline mixed with fuel oil will lower its flash point drastically and make it a dangerous material.

In spite of all these precautions and safety rules and procedures, the oil and gas industry still suffer from accidents. The causes vary between bad design, faulty equipment, maloperation, bad maintenance or human error. Nevertheless, the number of accidents compared to the volume of the industry, its spread to every corner of the globe, and the huge amount of materials extracted, handled, processed and delivered

to customers make such accidents an incidental thing. Even though, research establishments, working companies and individuals working in the oil and gas industry and all related industries and suppliers, are still striving to improve on the safety records of the industry

In general the following factors should be considered when studying each location for the maximum measure of safety the of site, environmental considerations, availability of water in sufficient quantities, ease of access to site especially at times of emergencies, laws and regulations, provisions for future expansion. When we take all these factors in view we shall find that decision about locating a major company providing the maximum measure of safety is a complicated and involved problem. This is quite true and such decisions might in the case of industrialized countries take years to resolve. In many cases public views are taken into account and this ad up to the complexity of the problem and might delay the decision still further in time. To ensure safety in oil or gas processing, to eliminate all hazards or to minimize them, we must review how hazards develop. Accordingly, we can devise a plan of action to deal with such sources of hazard right out at the beginning, i.e. at the design stage. This is “primary safety” and it is more effective and more economical than adopting all sorts of measures and recommendations to operate the company in a safe manner later. In oil industry losses often are large and heavy toll on the lives of human beings and equipment will therefore require attention and assess the risks that can be found, analysis and alert and educate all employees of their duties towards themselves and their colleagues.

In any oil handling or processing plan, the following are the main sources of danger failure in equipment due to bad materials or bad manufacturing, using machinery or equipment that are not suitable for the duty they are required to perform, stoppage or interruption of some basic services (electricity, steam, cooling water, etc...),loss of control of a reaction or a process in a closed vessel or reactor, blockage of piping resulting from a forgetter blind flange or due to sediments and corrosion products, external damage due to natural causes (wind, earthquake, tidal waves, etc...),external damage due to human action (sabotage, air raid, etc),operational error, i.e. human error, equipment failure due to corrosion or bad materials or workmanship, stoppage or interruption of some services (water, electricity, steam, instrument air, etc...),loss of control of reaction in a closed vessel.

Any of these factors can lead to leakage of combustible materials, leakage of inflammable vapors, fire, explosion, and generation of containable but dangerous pressure inside a vessel due to high temperature or other causes, mixing of various products that can lead to other hazards environmental pollution(ILO.2000)

## 2.4.1 RISK ASSESSMENT

A risk assessment is simply a careful examination of what, in your work, could cause harm to people, so that you can weigh up whether you have taken enough precautions or should do more to prevent harm. It is a structured and systematic procedure which is dependent upon the correct identification of the hazards and an appropriate estimation of the risks arising from them, with a view to making inter-risk comparisons for purposes of their control or avoidance. Risk assessment also provides the link between the scientific knowledge of the risks and the risk reduction measures to be taken. While risk assessment can be qualitative in nature, increasingly, the methods being used are becoming quantitative. In occupational health terms, the purpose of risk assessment is to enable a valid decision to be made about measures necessary to control exposure to substances or conditions hazardous to health arising in any workplace (Rampal and Sadhra, 1999).

Risk assessment is process of evaluating risk to workers safety and health posed by workplace hazards. It is systematic examination of all aspects of work, Employers are required to ensure the health and safety of workers and other persons, so far as possible, through application of certain principle. These principles include the evaluation of unavoidable risks and taking action to reduce them. Employers are requiring taking suitable and sufficient assessment of health and safety risks faced by workers in the normal course of their activities or duties, the purpose being to identify group of workers at particular risk in the performance of their duties, Measure to be taken to comply with employers' duties under regulation. Among such measure is the prevention of occupational risks, the provision of information and OSH training for workers (Kediri S, 2006).

The organization shall establish, implement and maintain a procedure(s) for the ongoing hazard identification, risk assessment, and determination of necessary controls the procedure(s) for hazard identification and risk assessment shall take into account

- a. Routine and non-routine activities.
- b. Activities of all persons having access to the workplace including Contractors and visitors.
- c. Human behaviour, capabilities and other human factors.
- d. Identified hazards originating outside the workplace capable of adversely affecting the health and safety of persons under the control of the organization within the workplace.
- e. Infrastructure, equipment and materials at the workplace, whether
- f. provided by the organization or others.
- g. Changes or proposed changes in the organization, its activities, or material, Any applicable legal obligations relating to risk assessment and implementation of

necessary controls(Occupational health and safety management systems – Requirements,18001-2007).

Some terms and definitions of risk

**Risk assessment:**

Process of evaluating the risk(s) arising from a hazard(s), taking into account the adequacy of any existing controls, and deciding whether or not the risk(s) is acceptable.

**Risk:**

Combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event or exposure(s)

**Acceptable risk:**

Risk that has been reduced to a level that can be tolerated by the organization having regard to its legal obligations and its own OH&S policy.

**Hazard:**

Is anything that may cause harm, such as chemicals, electricity working from ladders, an open drawer etc

**Workplace:**

Any physical location in which work related activities are performed under the control of the organization

Risk characterization is the primary means for communicating risk assessment findings. Many risk characterizations have relied primarily on mathematical estimates of risk to communicate risk assessment findings, often conveying an unwarranted sense of precision while failing to convey the range of scientific opinion. They are particularly difficult for audiences unfamiliar with risk assessment to comprehend. Effective risk management is impeded without effectively communicating information about who is at risk, how they might be affected, what the severity and reversibility of adverse effects might be, how confident the risk assessors are in their predictions and other qualitative information that is critical to decision-making, this is not the only way to do a risk assessment, there are other methods that work well, particularly for more complex risks and circumstances but this method is the most straightforward for most organizations. In general opinion the risk assessment consists of five different steps. While performing risk assessment the following steps should be followed

Step 1: Identify the hazards (Hazard Identification)

Step 2: Decide who might be harmed and how

Step 3: Evaluate the risks and decide on precautions

Step 4: Record your findings and implement them

Step 5: Review your assessment and update if necessary.

### 1-Identify The Risk

The purpose is to identify and list the possible hazards in each step of the job. The accidents in workplaces can be grouped and this categorization may be useful for identification process. Hazard identification includes items that can help about identifying workplace hazards and determining what corrective actions are necessary to control them. These items include jobsite safety inspections, accident investigations, health and safety committees etc. After identifying all activities and tasks the hazard identification could be performed. While performing hazard identification the pre-detected hazards for all tasks and activities should be taken into account. The hazard identification can be carried out by means of the field observations of responsible occupational health and safety staff as well as negotiation with working staff. An Organization, there are several ways in which hazards may be identified. These may include following: Accident Statistics; Investigations of accidents, and complaints Audits; Checklists and task analyses; Workplace inspections, including discussion and use of basic OHSAS instrumentation .

### 2- Identifying “Who may be harmed“?

For each hazard that you aim to identify, it should be clear who might be harmed. This will help about managing the risks. That does not mean listing everyone by name, but rather identifying groups of people. For each group, identify how they might be harmed, and what type of injury or ill health might occur. The following point should take into consideration while performing this identification process: Some workers may have particular requirements. For example, newcomers or inexperienced workers, expectant mothers and people with disabilities may be at particular risk. Therefore, an extra attention will be needed for some hazards People who may not be in the workplace all the time like visitors, and contractors(HS&E Office - Loughborough University, 2009).

### 3-Evaluate the risks

There are some certain standards of the levels of risks which employers must meet. These levels of risks range from those which are considered to be “unimportant”, “low”, “moderate”, “high” to those that are “unacceptable”. These levels are used as guidance for action on control measures to be taken by employers. Risks are considered to be negligible(Rampal and Sadhra , 1999).

### 3-1Definition for Risk Level

One of the stages that cannot be neglected during the review of design is the risk analysis techniques. This is applicable to all industrial companies and this certainly includes oil and gas companies. There are several techniques but they all depend on



cumulative experience of people taking part in them. It is fitting to remember some of the sayings in this concern:

- a. The cumulative experience is proportional with the quantity of equipment that has been destroyed.
- b. The sum total of our experience is the result of correcting our mistakes.
- c. In spite of what has happened, somebody knew that it was going to happen.

Risk analysis is a method of raising the safety factor. The more effort and time we spend, the higher we hope is the safety factor. The methodical way adopted for risk analysis was created and used by the nuclear industry in the fifties of the twentieth century to cater for the nuclear power generation industry. It was adopted later for the oil and gas industry. The great advantage of this technique has proved its worth which makes it a very beneficial technique. All projects have risks and uncertainties. In some cases the effect of such risks and uncertainties can be very significant. However many managers still did not employ proper project risks management processes. In many cases they do not believe that establishing and implementation of such process will be beneficial, since it is difficult to predict all potential risks and their affect of the project. There exist several methodologies to assess the risks such as Fault Tree Analysis (FTA), Hazard and Operability Study (HAZOP), Job Safety Analysis (JSA), Preliminary Hazard Analysis (PHA), X-type Matrix). The most frequently used approach is the Risk Assessment Decision Matrix which was initially developed as a military standardization. The matrix diagrams are used to analyze the correlations between two or more parameters. 5x5 matrix diagrams is ideal for especially individual analyses. The rating and measurement of probability of occurrence of an event and the corresponding results can be performed by using this method. Actually, in many source the matrix methods are classified as semi-quantitative as its risks categorization based on a quantitative value, In this method the risk categorization is made upon a risk criticality scoring. The risk scores can be easily found by following formulae:


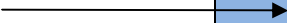
$$\text{Risk Score} = \text{Accident Frequency Score} \times \text{Hazard Severity Score}$$

Steps to use the matrix:

- a. Analyze your overall project and break it down into the individual steps that make up the overall experiment.
- b. List in the following table the hazards you have identified that are associated with each particular step of your experimental activities.
- c. Briefly describe in the table below the risks associated with each hazard that you have identified.
- d. Using the Risk Matrix above, assess and record in the table below the risk presented by that hazard.
- e. Address risks with the highest level first.

- f. Develop and describe what Control Measures are to be used to minimize the risk and re-evaluate the risk level.
- g. Extreme and high risks ARE NOT acceptable.

**Table: 1-2Matrix of risk**

		Consequence 				
		Near hit, no injury. No \$ lost or damage	First Aid treatment required for a minor injury Property damaged but can still operate	Medical treatment OR lost time injury. Property damaged but can be fixed immediately	Serious injury requiring admission to hospital OR permanent disabling injury. Notifiable to regulatory Authority. Equipment damaged	Fatality, maximum high level headline exposure and loss of credibility. Equipment damaged/destroyed
Likelihood		Insignificant	Minor	Moderate	Major	Severe
It is expected to occur in most circumstances e.g. Daily	Almost certain	Medium	High	Extreme	Extreme	Extreme
Will probably occur in most circumstances. e.g. weekly	Likely	Medium	Medium	High	Extreme	Extreme
Might occur at some time e.g. Annually	Possible	Low	Medium	Medium	High	Extreme
Probably won't, but could occur at some time. e.g. once every 5 years	Unlikely	Low	Medium	Medium	Medium	High
May occur in exceptional circumstances. e.g. Once every	Rare	Low	Low	Low	Medium	Medium



<b>Extreme</b>	Dangerous level of risk which is required to be controlled immediately. Access and exposure to the hazard should be restricted until the risk can be lowered to an acceptable level.
<b>High</b>	Unacceptable level of risk which must be controlled immediately. Control measures would involve designing out the source of the risk from the task or activity.
<b>Medium</b>	An acceptable level of risk. Low cost control measures (such as provision of information and training) should be undertaken to control these types of risks. If these controls already exist and are deemed to be effective, no further investment is necessary.
<b>Low</b>	These risks are considered acceptable. Accordingly, no further action is necessary. However, if there are controls which can be initiated that are easy and inexpensive they can still be administered

([www.jcu.edu.au/.../Risk](http://www.jcu.edu.au/.../Risk)).

#### 4-Record of Findings

It is a good practice to record any accidents involving injuries or illness in a computer or a network database. The following information should be included in entries:

- a. Date and time of accident or incident
- b. Place of accident or incident
- c. Name and position of subjected person or people
- d. Details of accident or incident and first aid given
- e. The situation of causality after the event (hospitalized, back to work, etc.)
- f. Name, position and if applicable the signature of person dealing with the accident or incident.

The record keeping is required for nearly all areas of workplace and it is important to keep these records up-to-date. For OHSAS point of view, the records that need to be maintained are employee accidents, injuries, illnesses, accident investigations, causalities, near misses, training records, medical records. Keeping records of the assessment and any control actions taken is very important. You may be required to store assessments for a specific number of years. Check for local requirements in your jurisdiction. The level of documentation or record keeping will depend on the level of risk involved, Legislated requirements, and/or requirements of any management systems that may be in place.

The records should show that you:

- a. Conducted a good hazard review.
- b. Determined the risks of those hazards,
- c. Implemented control measures suitable for the risk
- d. Reviewed and monitored all hazards in the workplace
- e. Review your risk assessment and update if necessary

It is important to know if your risk assessment was complete and accurate. It is also essential to be sure that change in the workplace have not introduced new hazards or changed hazards that were once ranked as lower priority to a higher priority, It is good practice to review your assessment on a regular basis to be sure that nothing has changed and that your control methods are effective. Triggers for a review can also include the start of a new project, a change in the work process or flow, a change or addition to tools, equipment, machinery (including locations or the way they are used), new employees, moving to a new building or work area, introduction of new chemicals or substances, When new information becomes available about a current product.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

Based on the literature on the subject under study and relates to the research objectives, scope and the adapted research design, descriptive study was carried out; four hypotheses were postulated to evaluate the impact of the application of OHSAS 18000 in the oil industry in Sudan. Survey questionnaire was administered to sample of (30), statistical analysis were conducted using SPSS ,descriptive statistic and statistical inference were used to test the hypotheses.

#### **3.1 Study area**

This study was conduct in Khartoum states during (2011-2013) involving oil industry Companies the research methodology depended questionnaire and interview employees in the company selected to find out their views on extent of development that has been in the system and whether there is a continuous development.

#### **3.2 a Study population**

survey questionnaire was administered to (45) samples, statistical analysis were conducted using SPSS to calculate reliability of questionnaire, descriptive statistic and statistical inference were used to test the hypotheses and the targeted population of this study consists of oil Industry Company (45) Samples were selected from target

population using simple random sample, (30) complete usable questionnaire were **returned** from respondent.

### **3.3 Primary data**

The questionnaire to determine the extent of development in the safety system in every area of the company that has been the application (Closed end questionnaire), was used to obtain accurate primary data with aim of producing data for analysis, the questionnaire **consists** of four part related to the hypothesis under study. For data analysis both descriptive statistics and statistical inference were used (for testing hypothesizes), then analysis the questionnaire and information available from the company before and after the application of the system to find a gap and the extent of closed down and improvement of system.

### **3.4 Secondary data**

The information about the topic under studies (OHSAS) the method involved an extensive search of books, references, journal, published research and internet for example, and focused on obtaining literature from **a range** of authoritative special book that covered OHSAS. Also specific site including

:[www.ohsas.org](http://www.ohsas.org). [http://en.wikipedia.org/wiki/Petroleum\\_industry](http://en.wikipedia.org/wiki/Petroleum_industry).

The flowing key **words** were used in **search's** OHSAS, OSH.



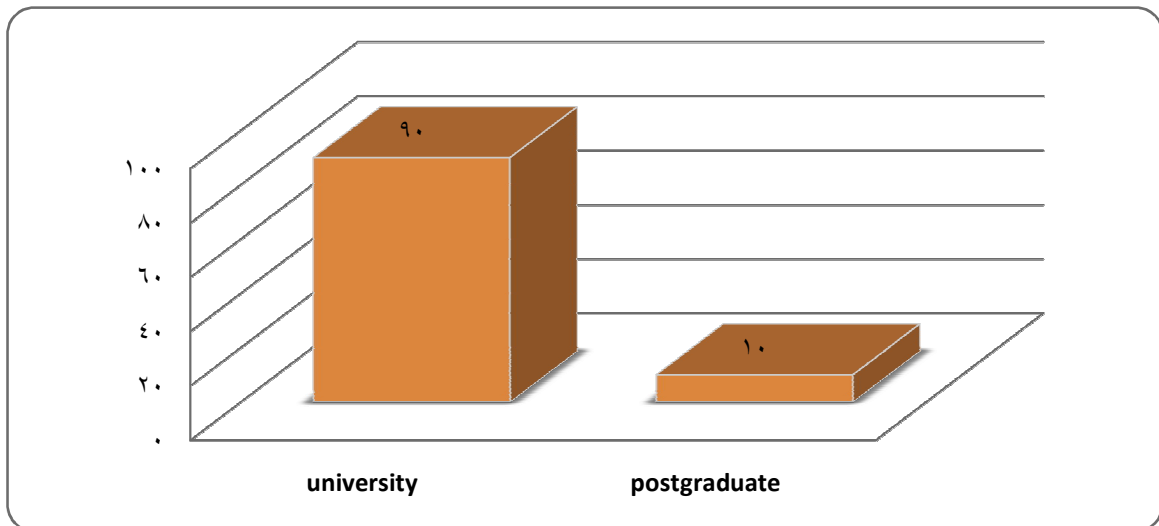


**CHAPTER FOUR**  
**RESULTS & DISCUSSION**

## 4-1 RESULTS& ANALYSIS

This study was conducted in Khartoum state, the target populations consist Employees in Oil Company Usable closed ended questionnaires were coded and entered into Statistical package for social science SPSS, Both descriptive and statistical inferences were used

In this section, the results of statistical analysis carried out using chi square are presented:



Qualifications Figure: 4-1 Qualifications

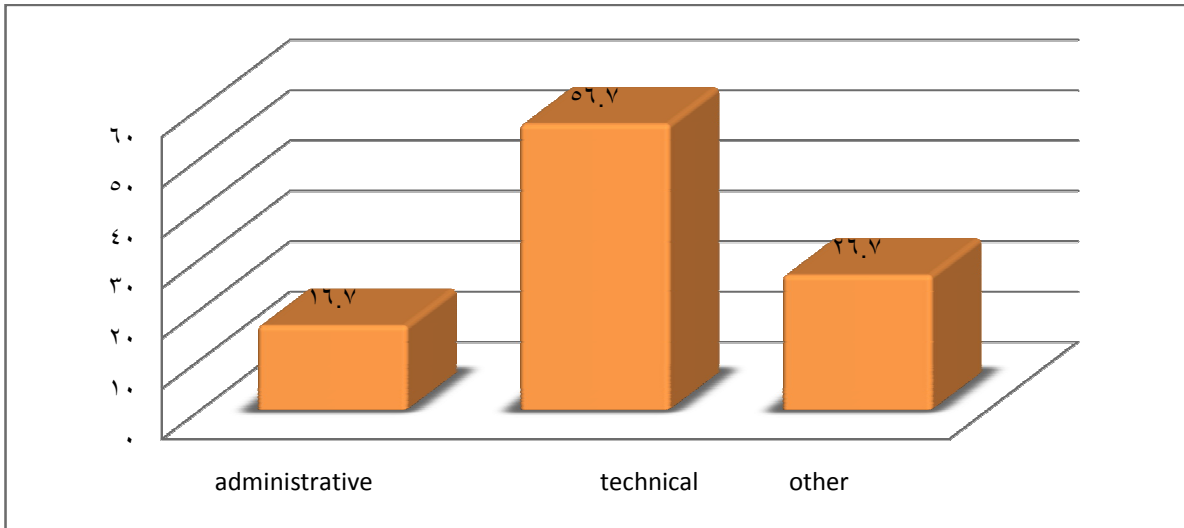


Figure: 4-2 Job Description

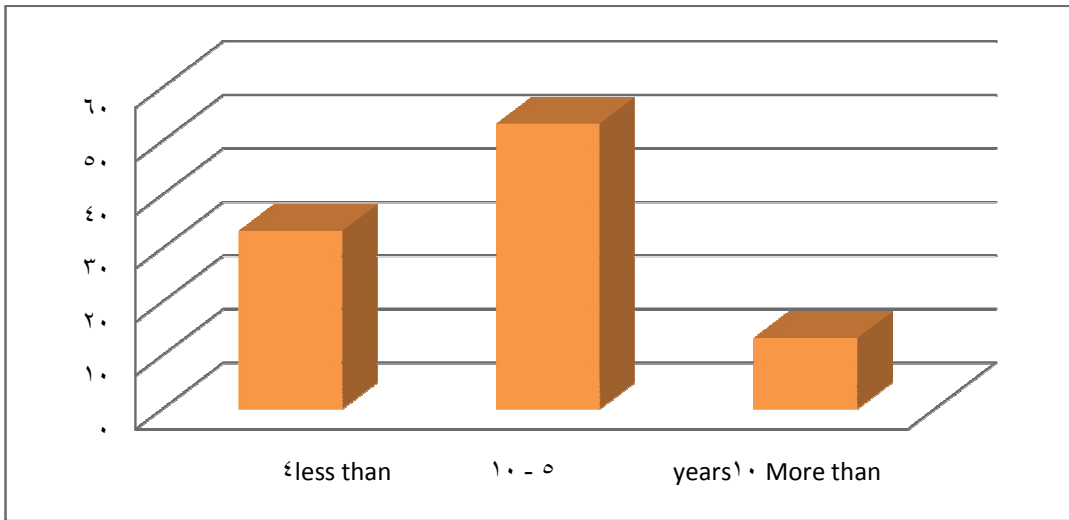


Figure:4-3 Years of Experience

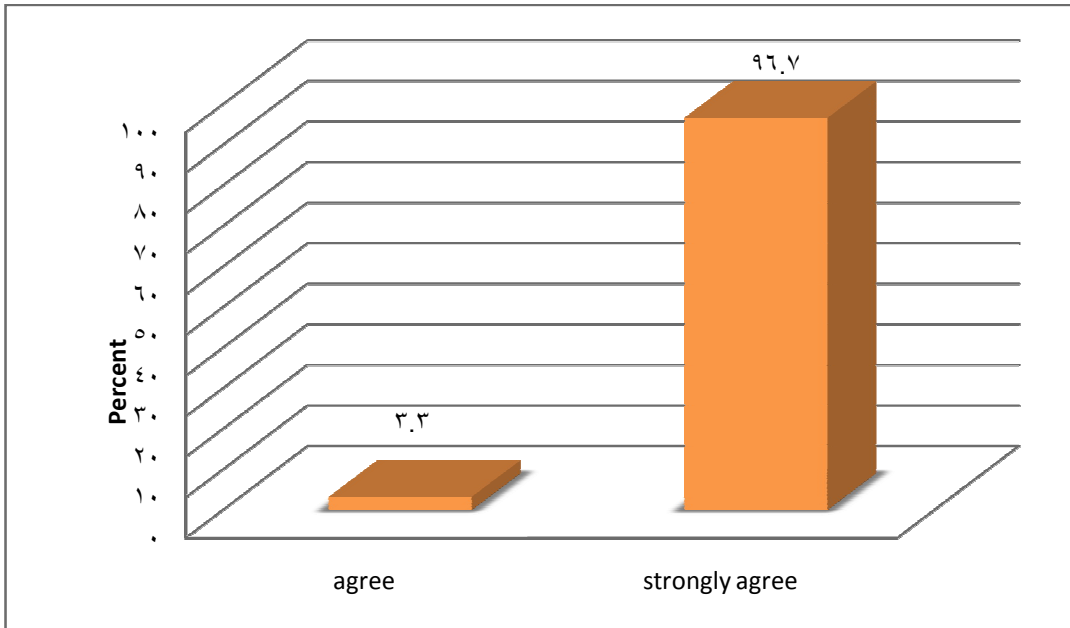


Figure 4-4 the existence of an Occupational Safety and Health system reduces the wastage of resources in organization.

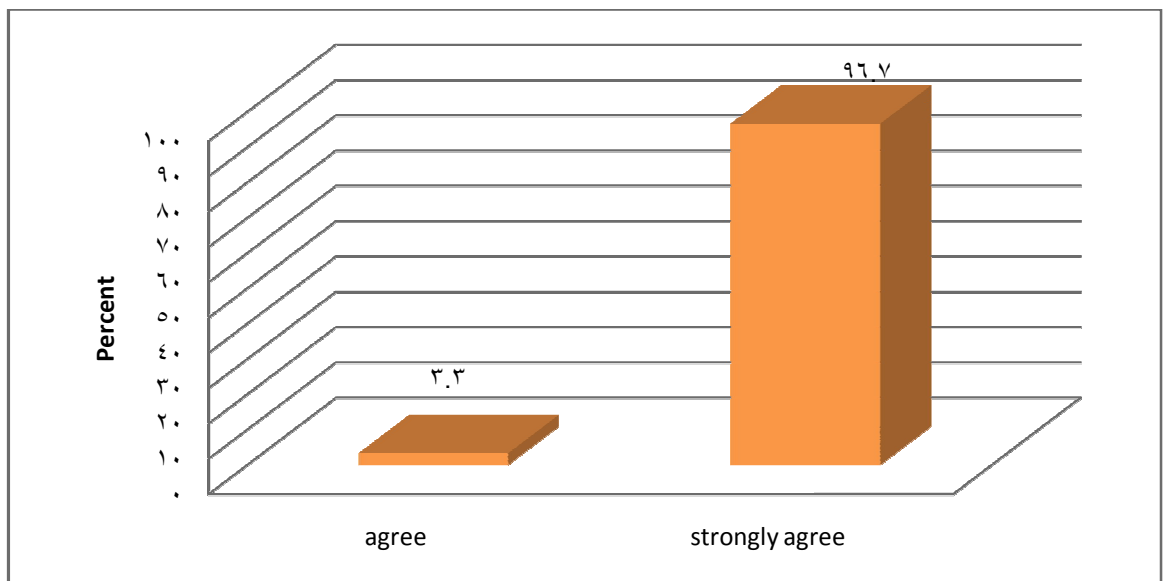


Figure: 4-5 Publication of protection culture reduces the wastage of resources in the organization.

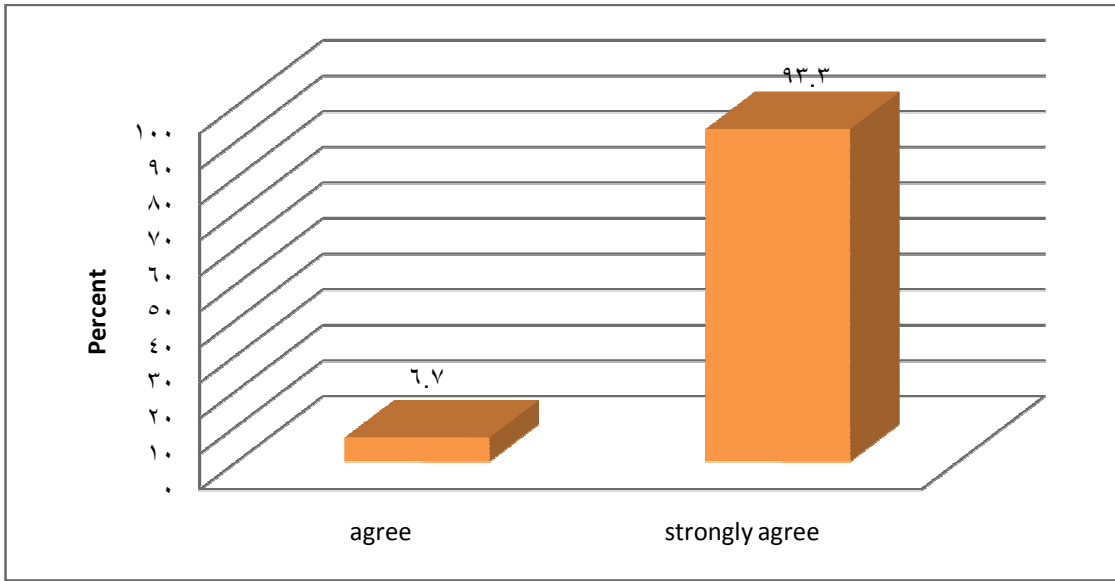


Figure: 4-6 To reduce wastage, protection procedures, and the installation of an emergency system should be applied.

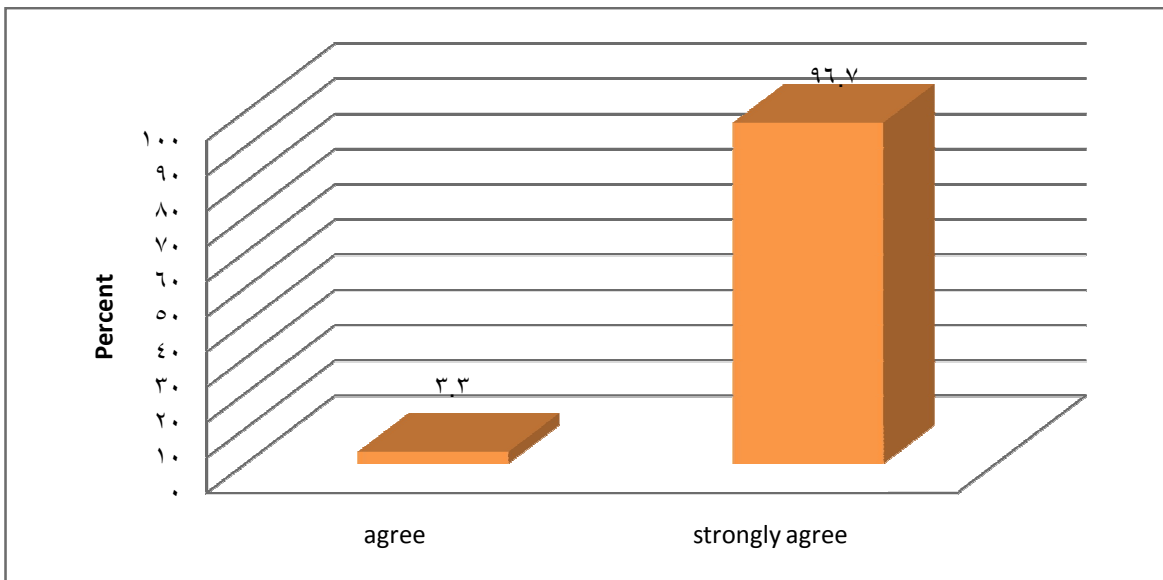


Figure: 4-7 the commitment of senior management contributes to the application of occupational health and safety in the organization.

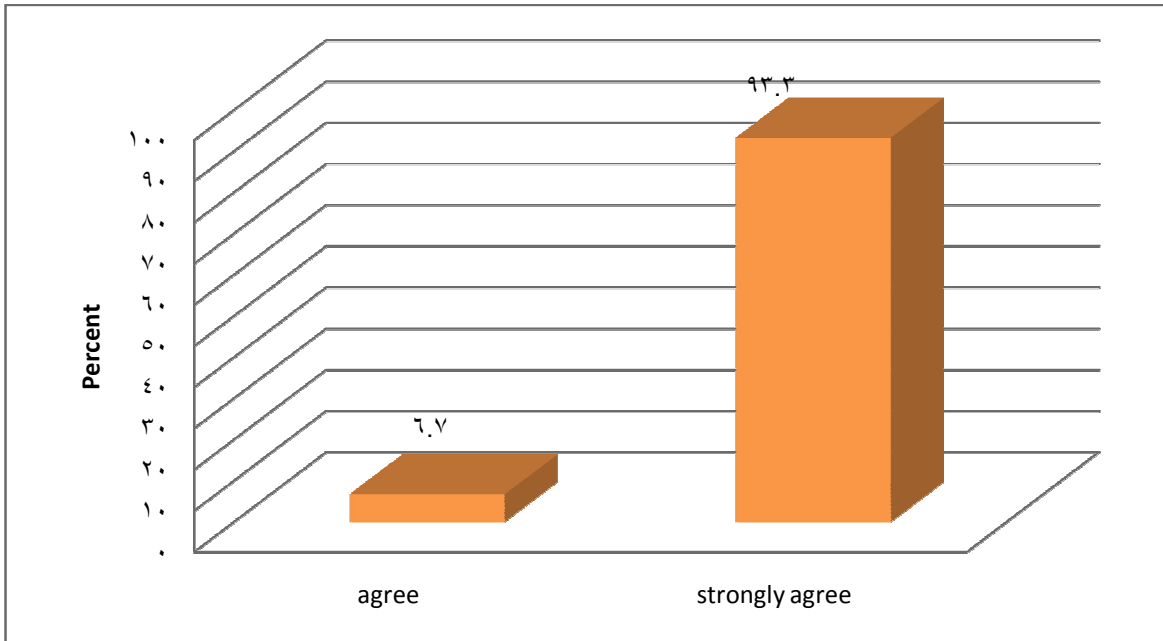


Figure:4-8 The participation of employees in the preparation implementation, development of internal regulations maintaining the Occupational Safety and Health contributes to resource conservation.

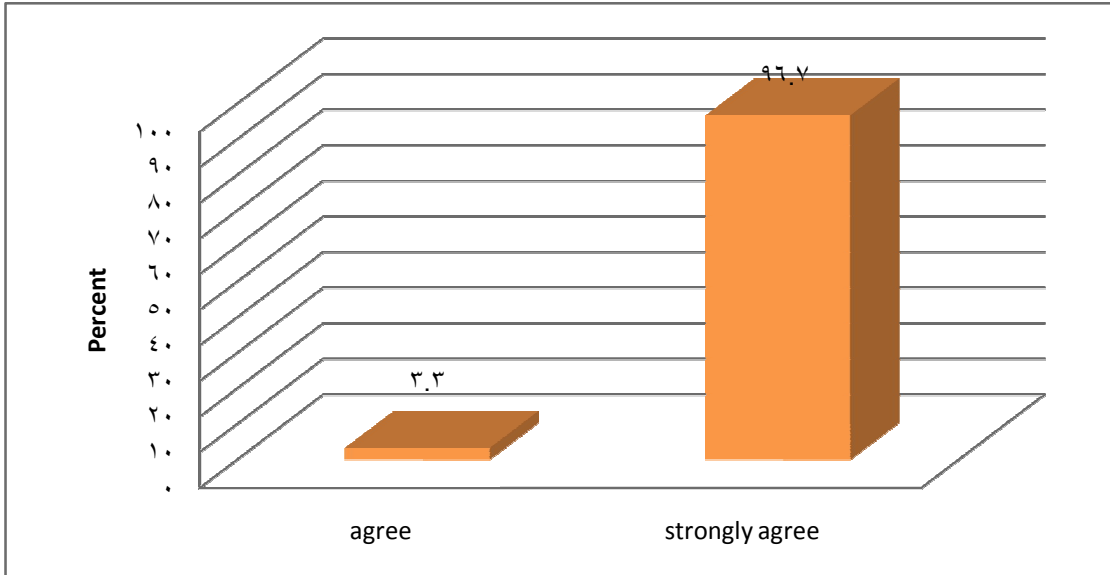


Figure:4-9 The existence of laws apply dissuasive conserve resources

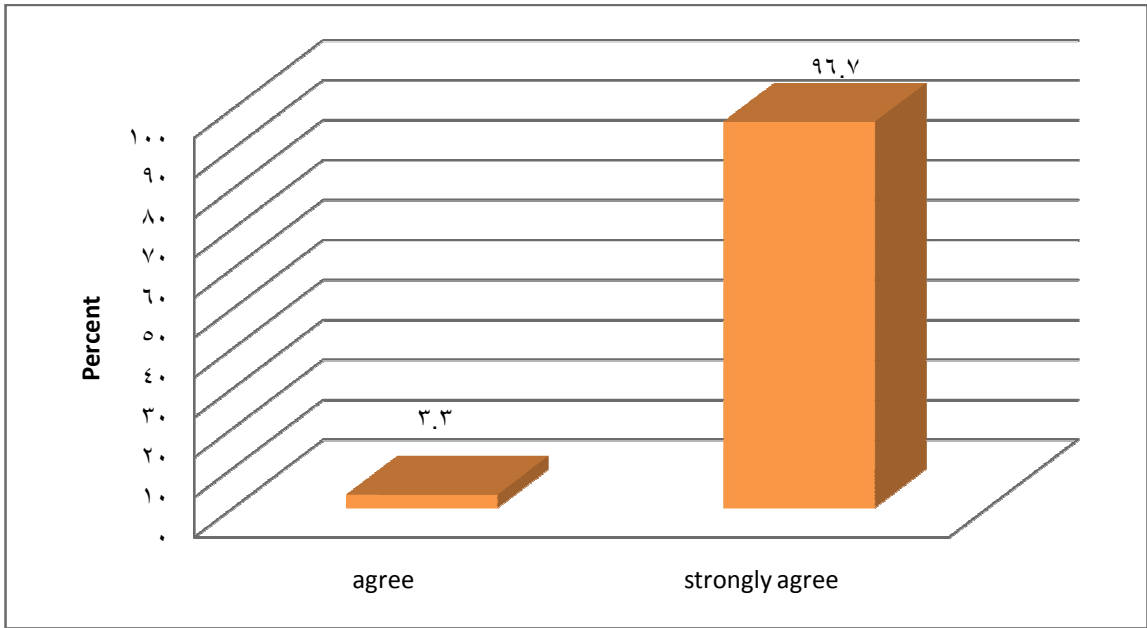


Figure: 4-10 the existence of an easement system of applications contributes to the development of the whole system.

Hypotheses (2) There is a relationship between the overall objectives with regard to occupational safety and health and the application OHSAS 18000.

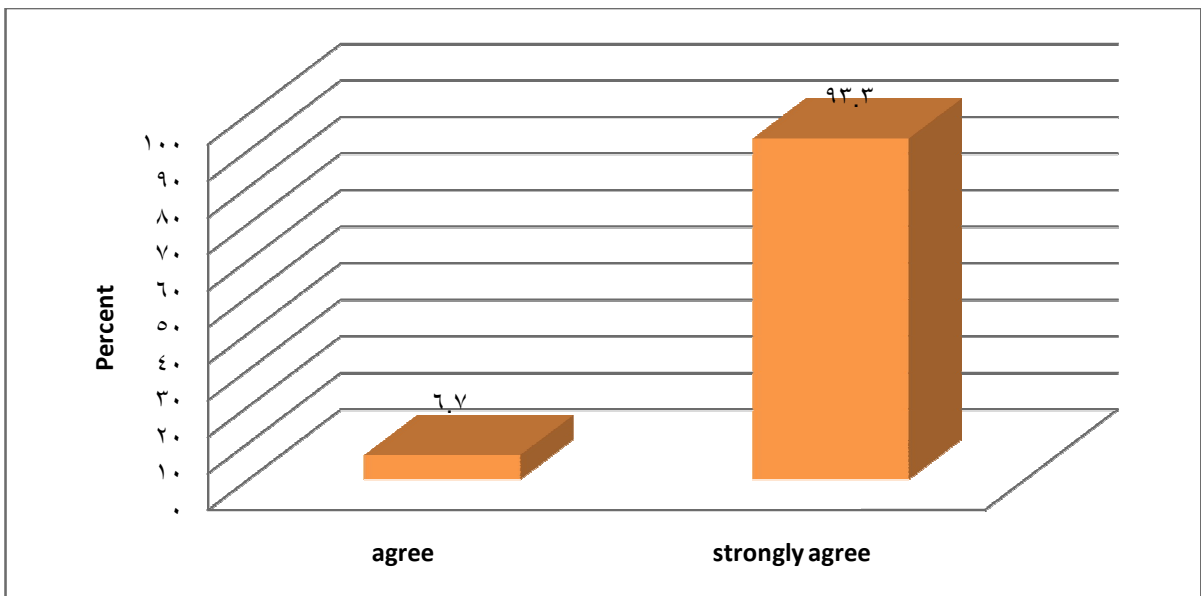


Figure: 4-11 the organization's goals that applicable and congruent with the system of OHSAS18000 its applications are clear and can be measured by the OHSAS18000.

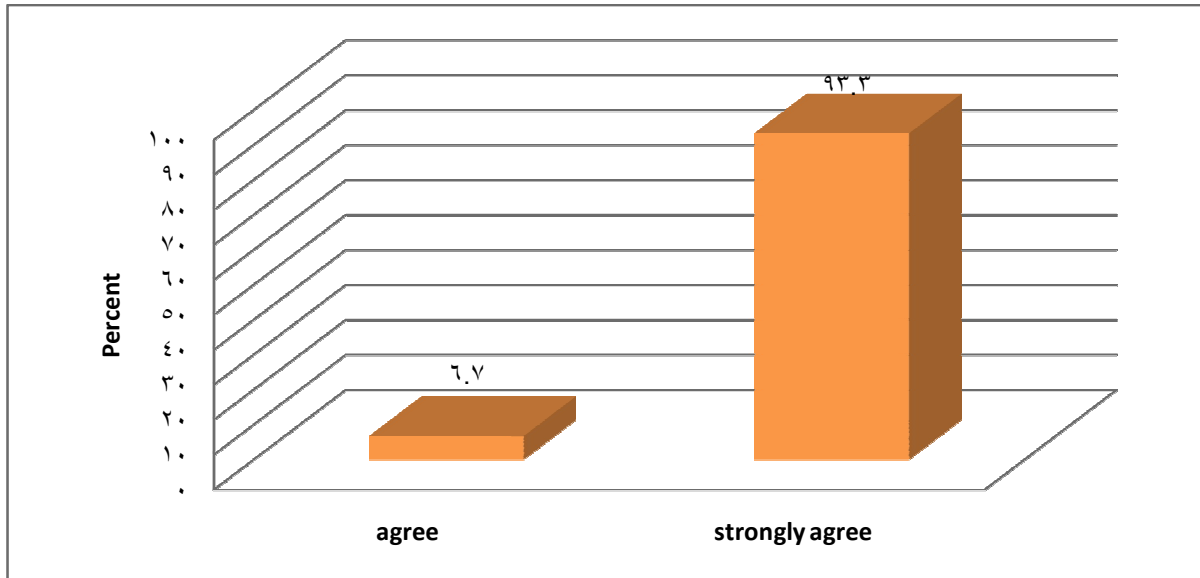


Figure: 4-12 the organization that record and define the scope its internal regulations clearly, helps its employees on the application.

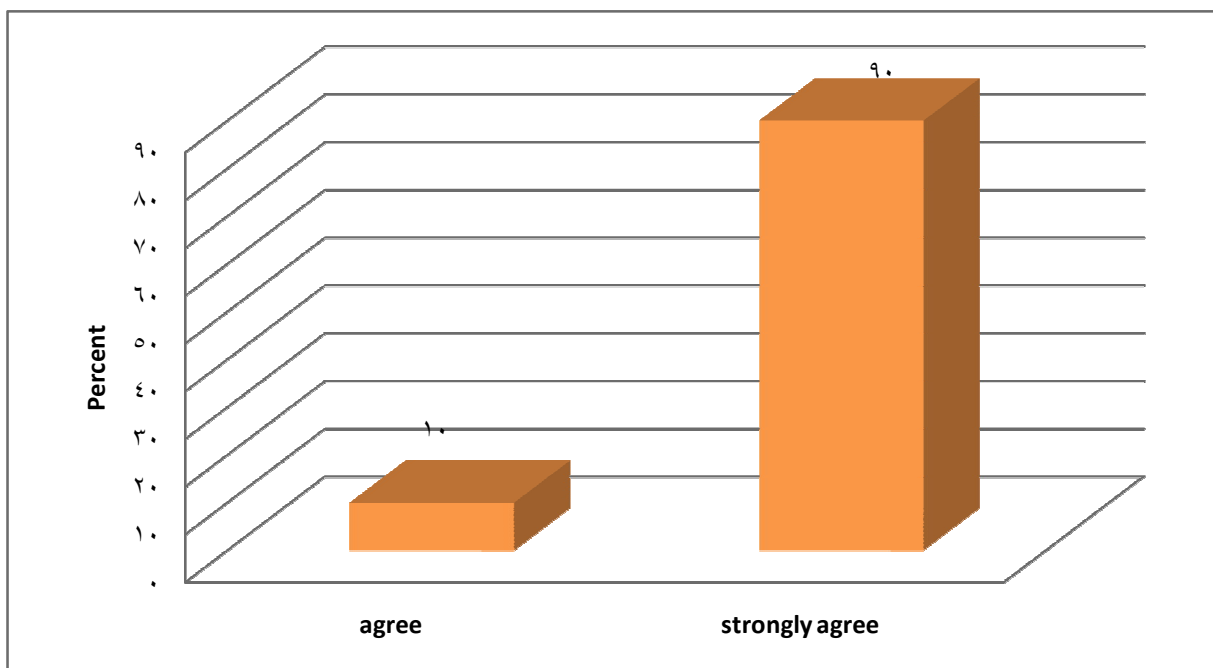




Figure: 4-13 Development of a plan for implementing safety goals is an important condition for the implementing of a safety management system.

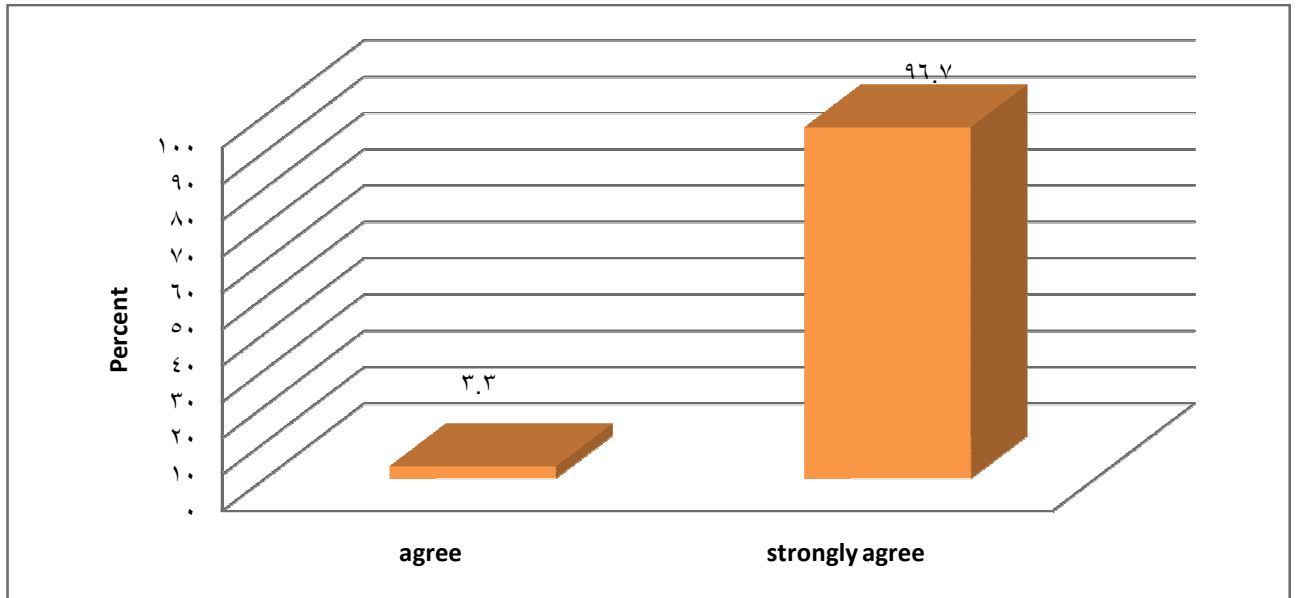


Figure: 4-14 Instructing and publication of Occupational Safety and Health requirements is important to minimize the risks

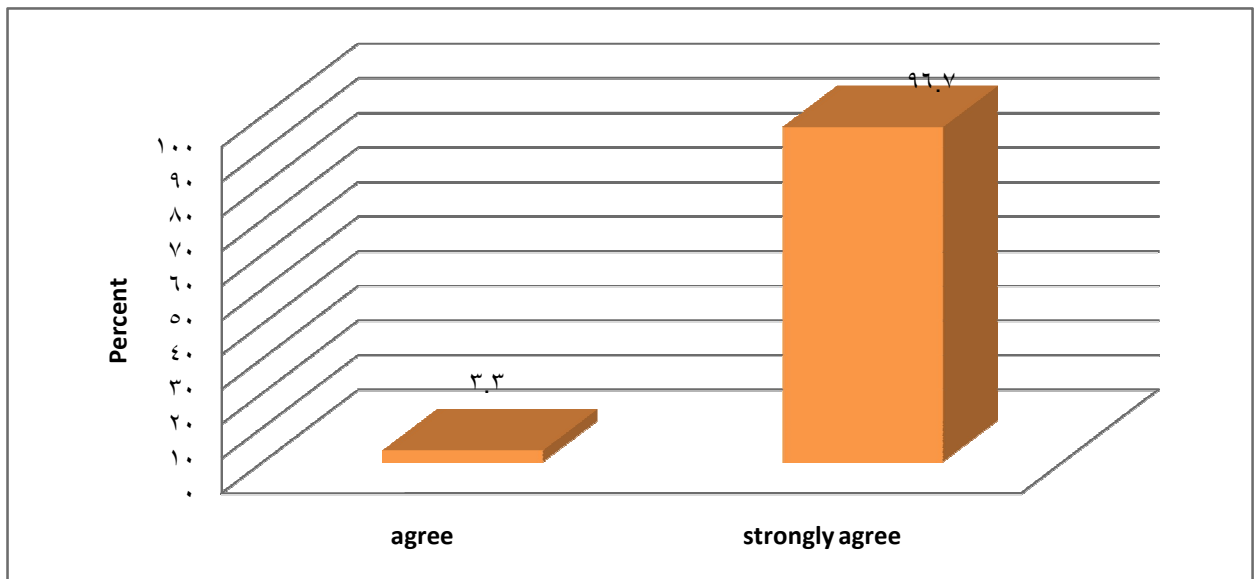


Figure: 4-15 considering the safety as a system based on the use of scientific facts reduces occupational exposures.

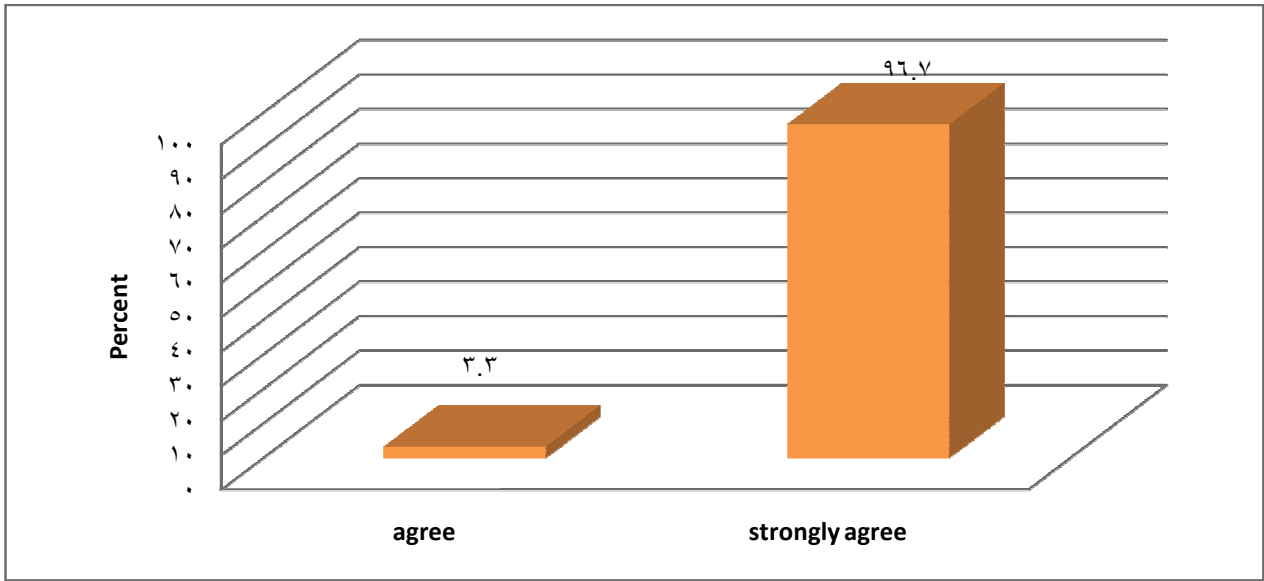
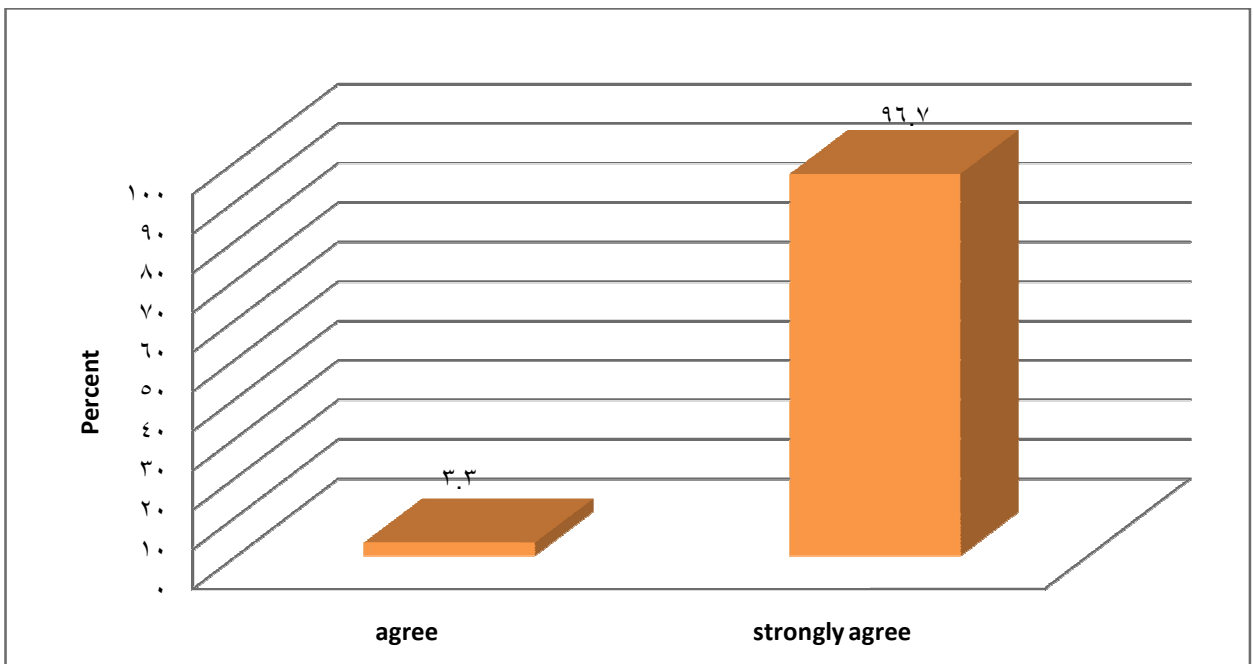


Figure: 4-16 Amendments of the General system of the organization in line with OHSAS regulations help conserve resources.



Figur: 4-17 The organization's goals contain the general Framework of OHSAS  
 Hypotheses (3) Safety oriented work force is positive factor for organization safety performance.

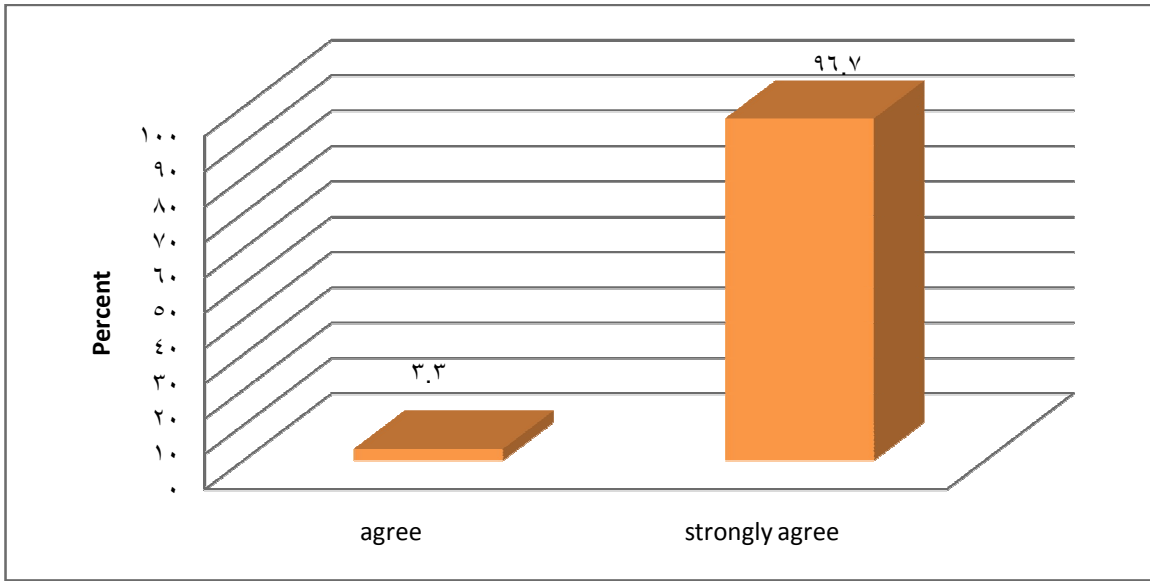


Figure: 4-18 Providing employees with the knowledge and equipment required to perform their jobs efficiently increases occupational safety and health in the organization

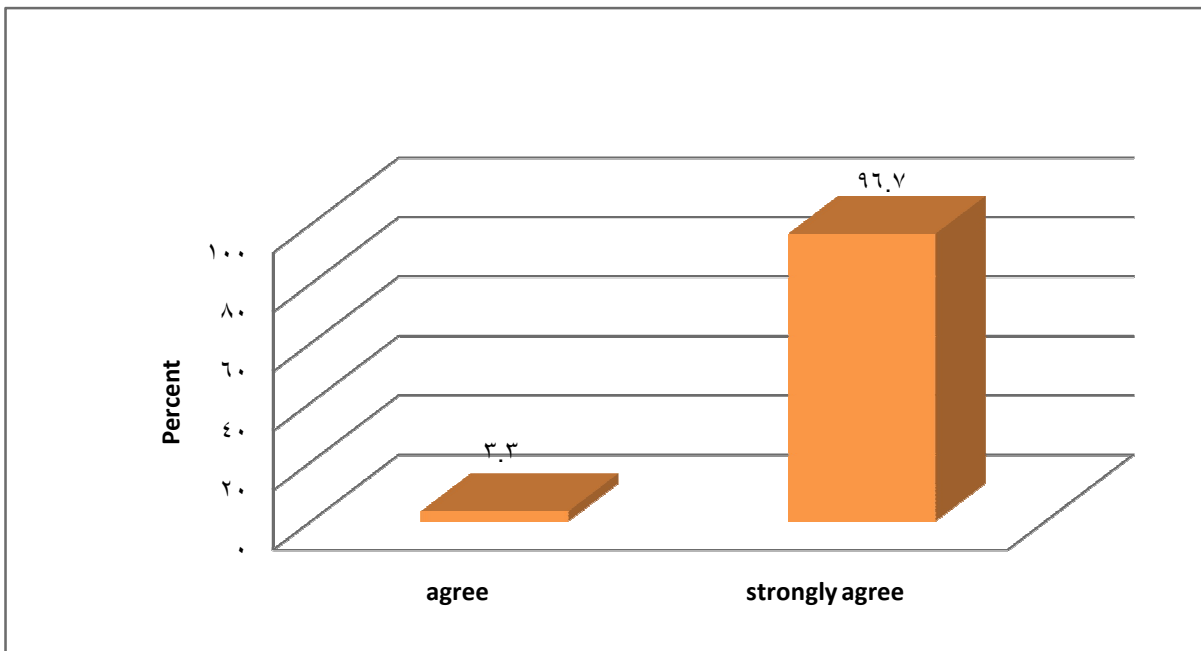


Figure: 4-19 Identifying roles and responsibilities, improve the performance of the safety system.

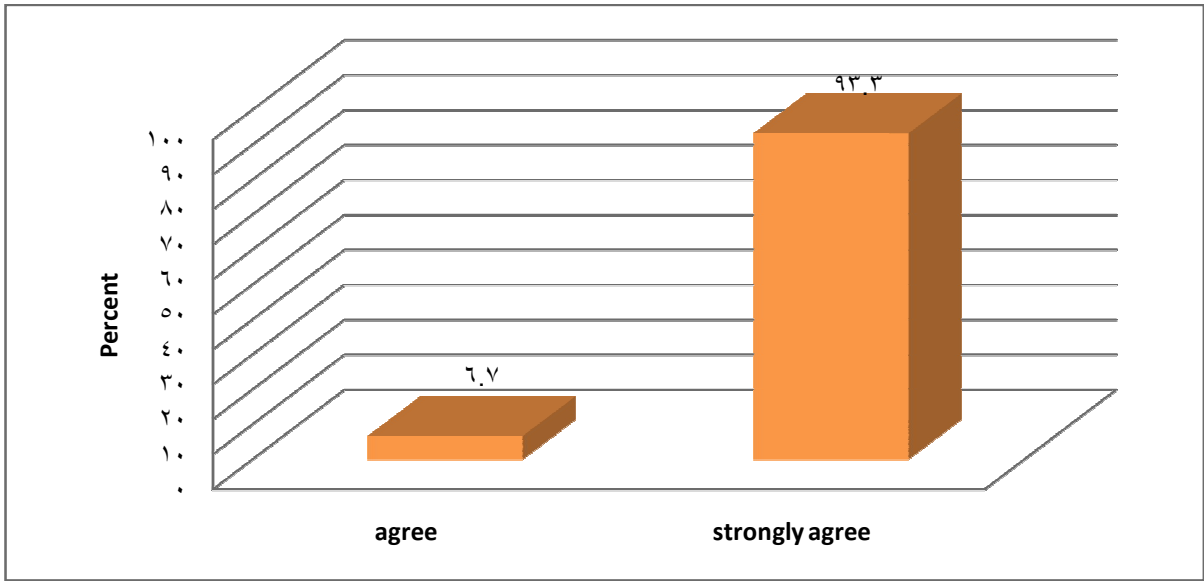


Figure: 4-20 To improve the efficiency of the safety system, the Procedures and applications of work must be applied.

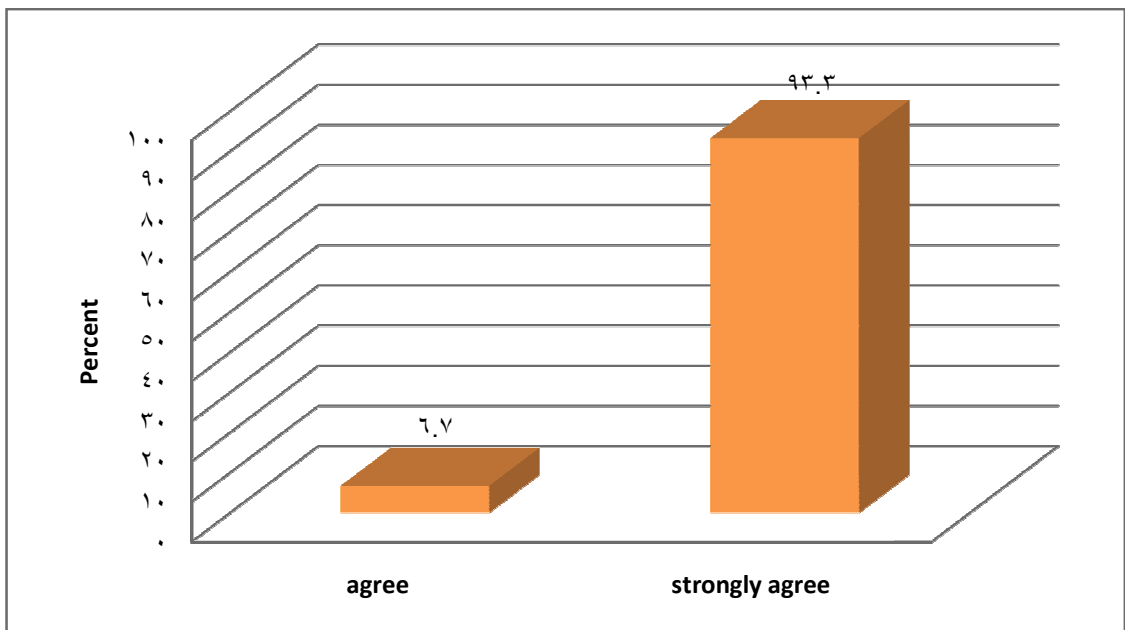


Figure: 4-21 Management support for ideas of supervisors and employees in decisions relating to occupational safety and health reduces the risk in the work environment.

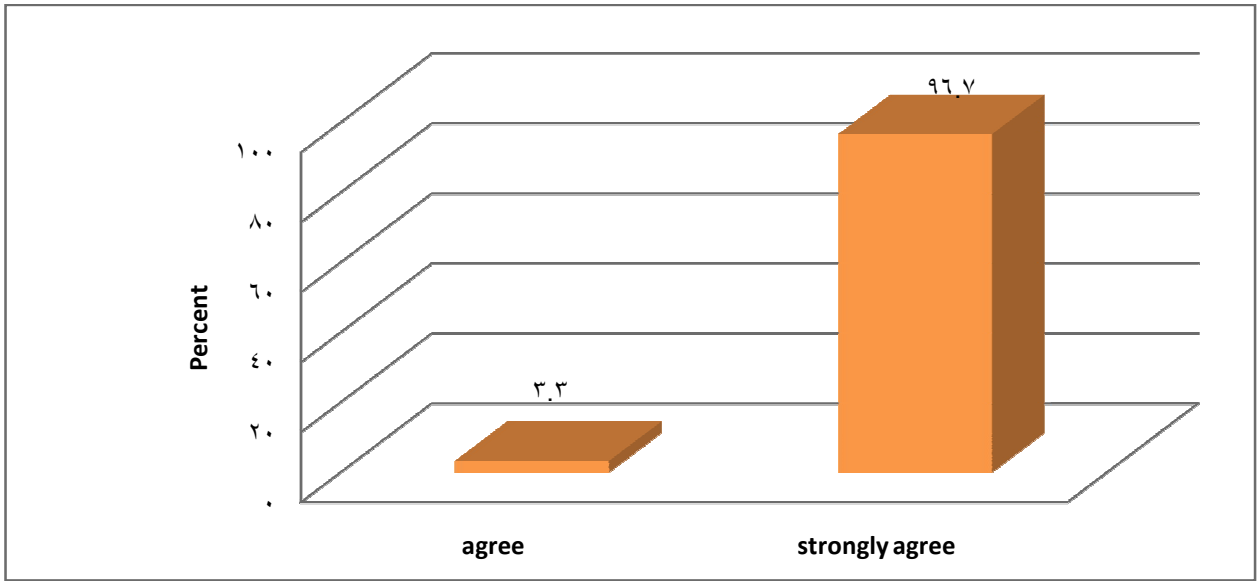


Figure: 4-22 employees' awareness of safety requirement.

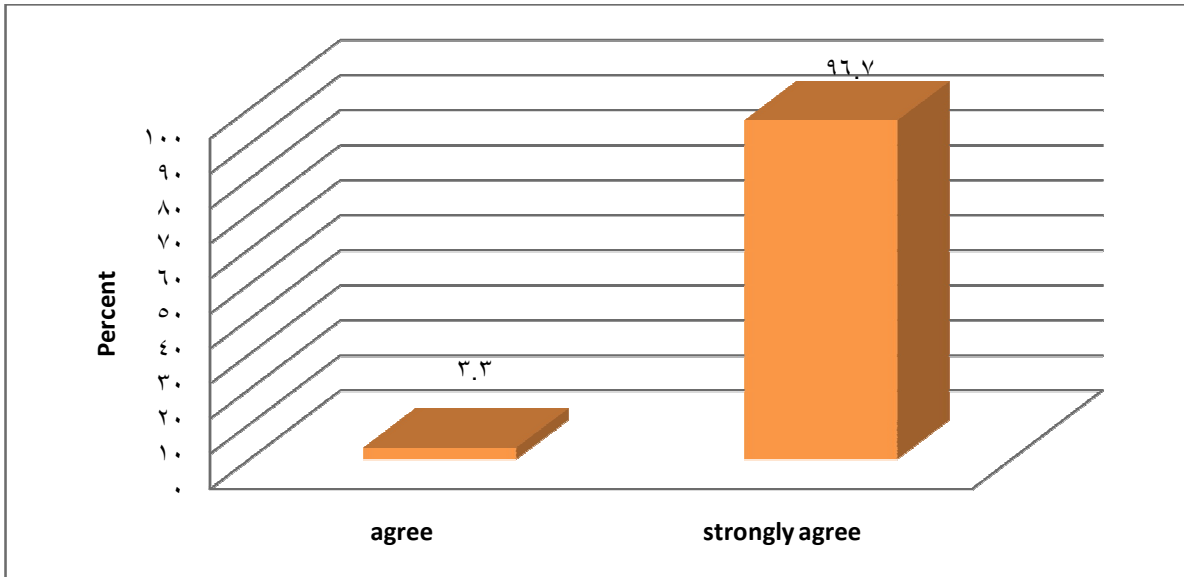


Figure: 4-23 Reduce lost working time resulting from accidents

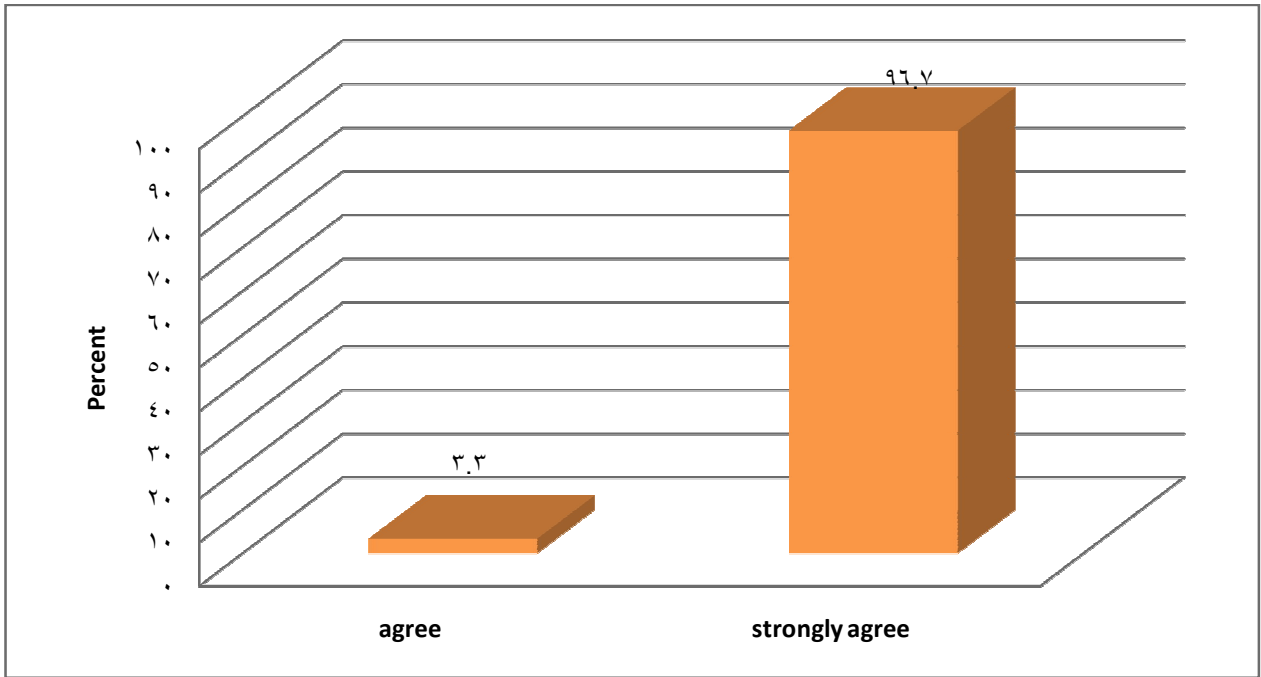
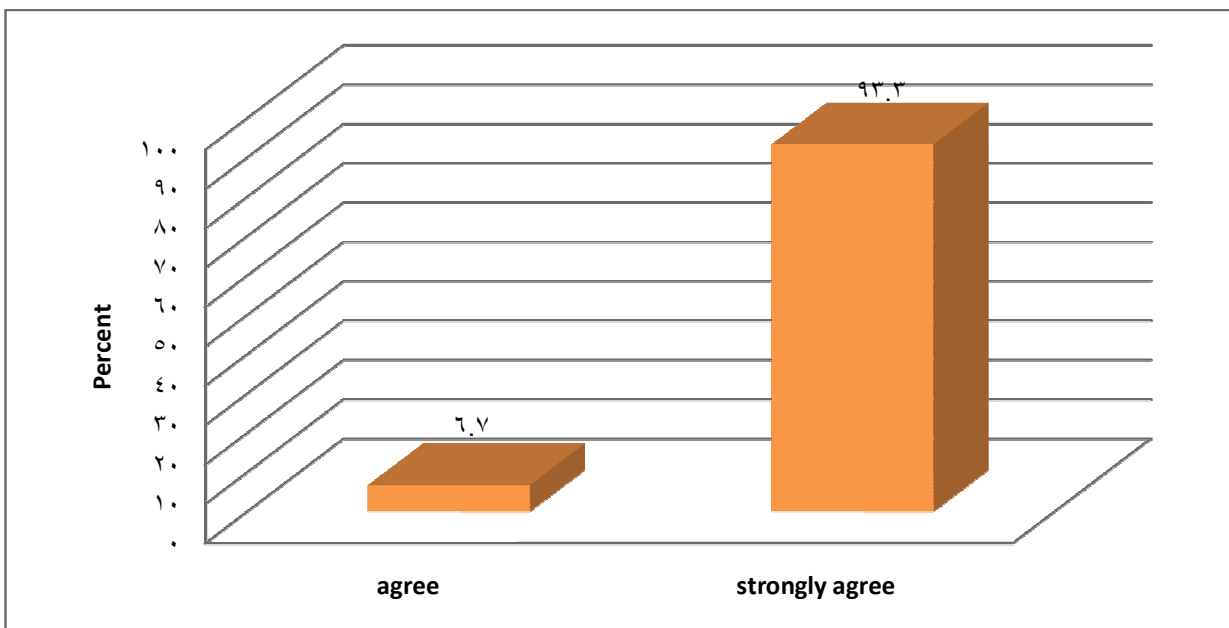


Figure: 4-24 Reduction of accidents before they occur depends on identifying and knowledge of dangerous places for the safety of the employees.

Hypotheses (4) The close relation connection between efficient safety management and organization performance.



4-25 The efficiency safety system reduces the direct and indirect cost of accidents and also injuries.

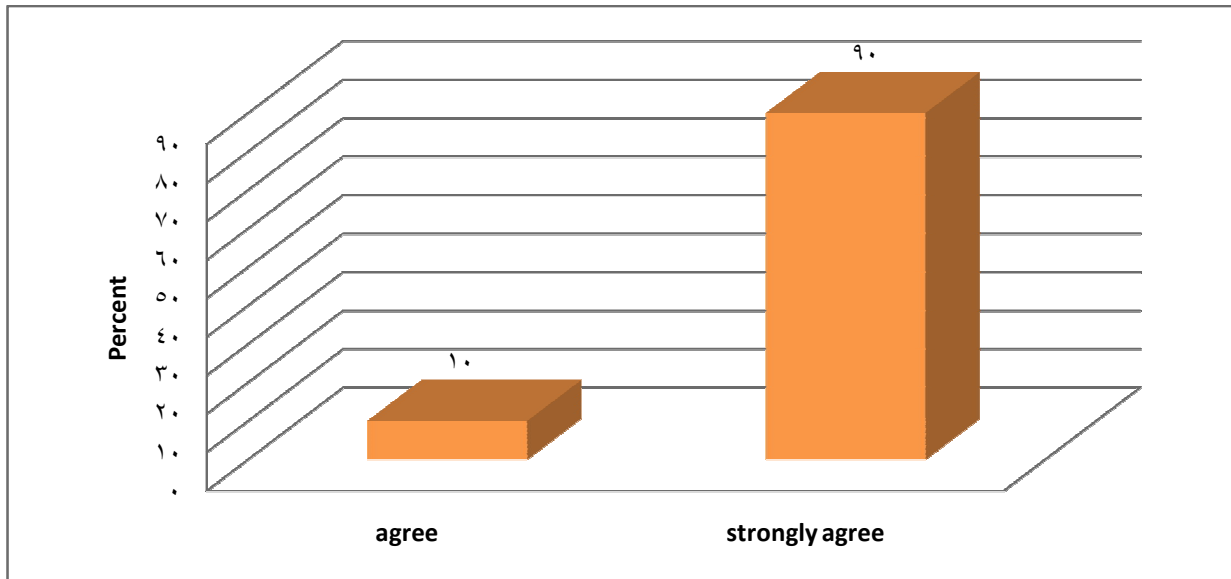


Figure: 4-26 preventive measures increase the organizational efficiency.

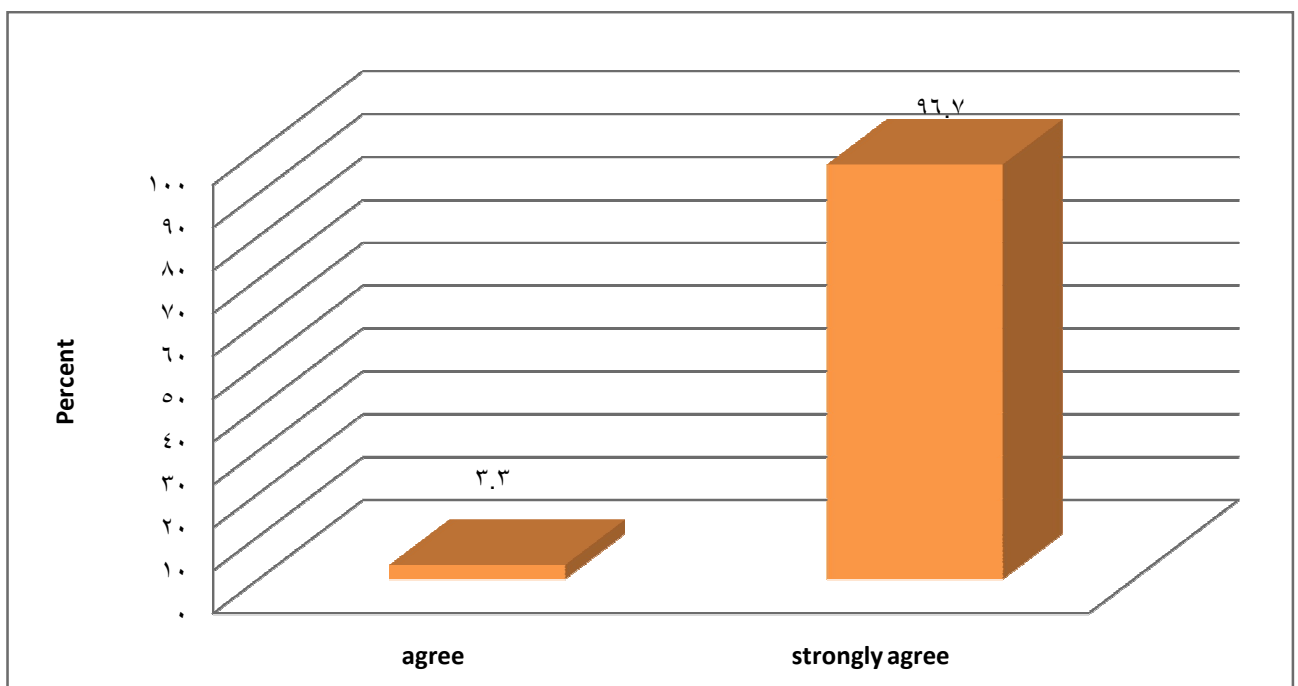


Figure: 4-27 the efficiency safety system reduces the direct and indirect cost of accidents and also injuries.

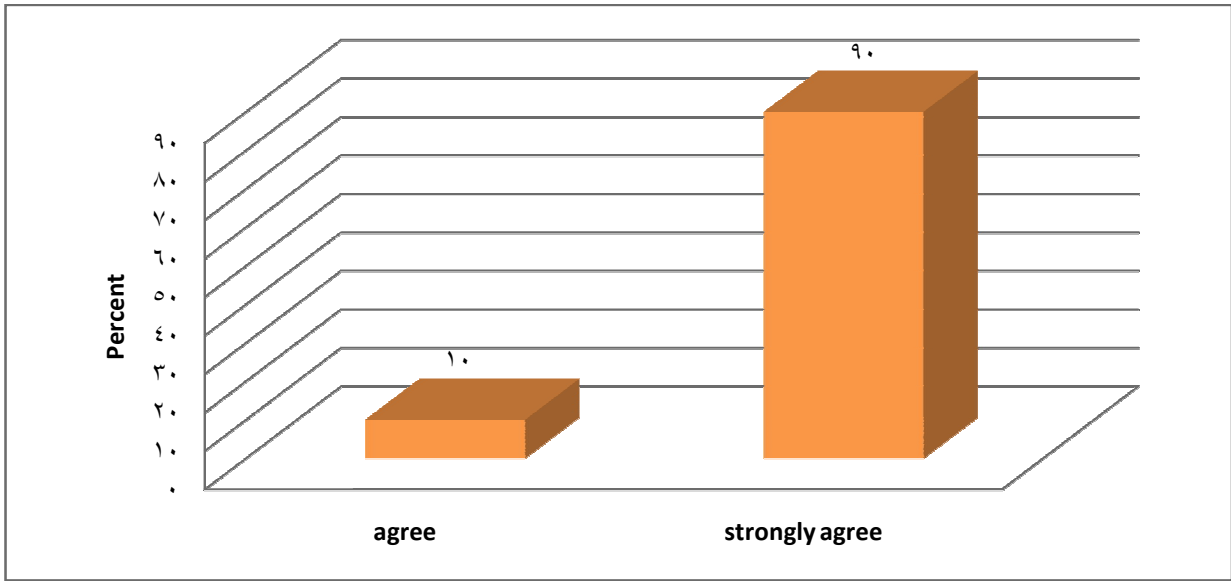


Figure: 4-28 the efficiency of protection procedures help to achieve the objectives of quality operations.

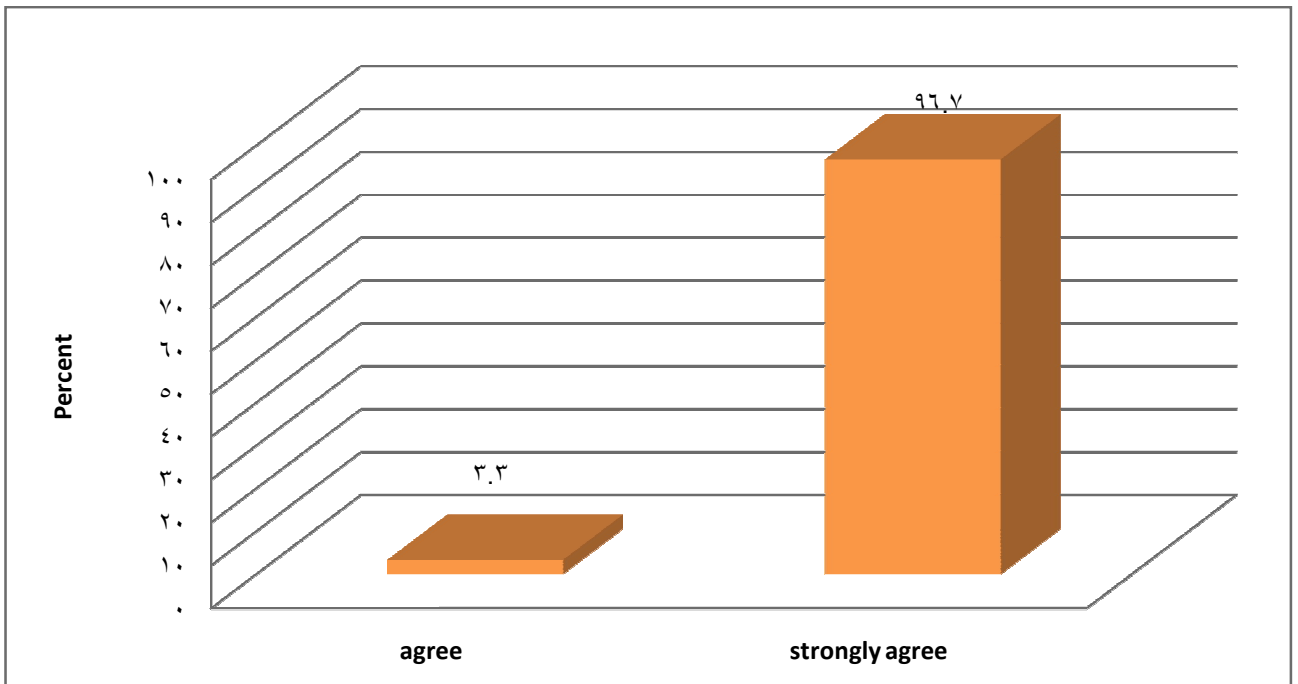


Figure: 4-29 Good Maintaining reduces accidents manpower.



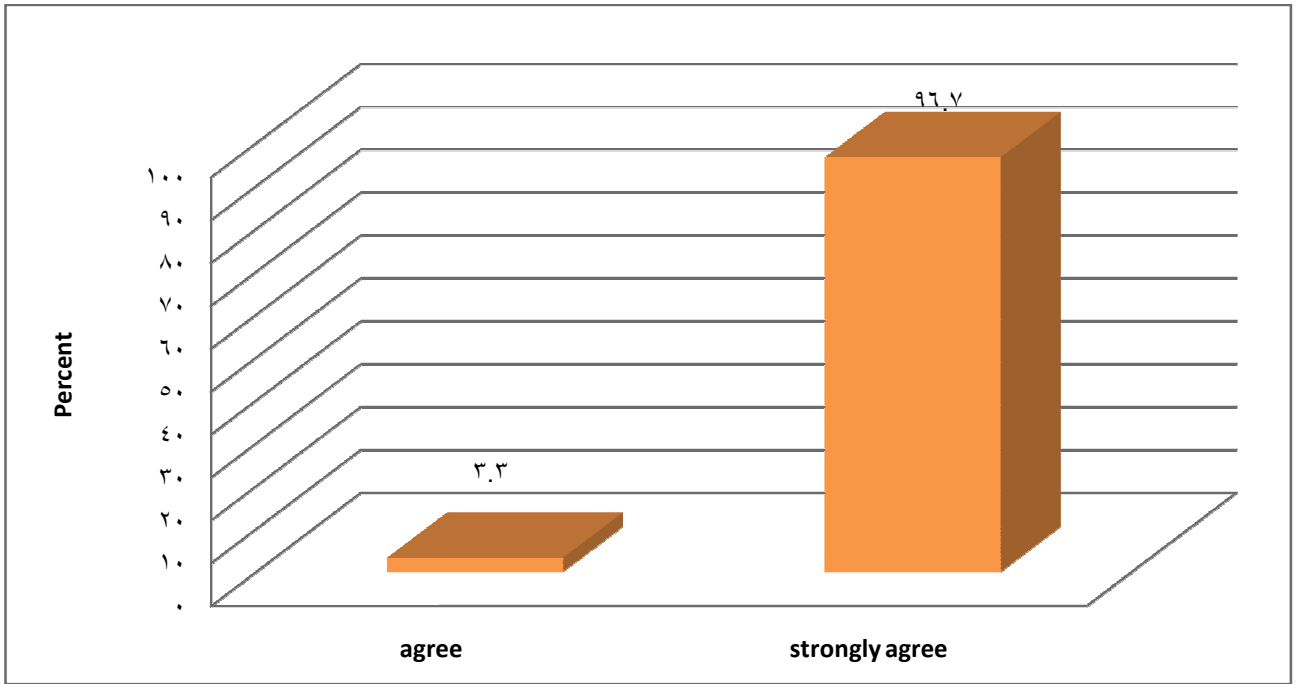


Figure 4-30 The connection between the methods of safety, occupational health, production management systems, services and technological processes applied to boost the efficiency of the organization's.

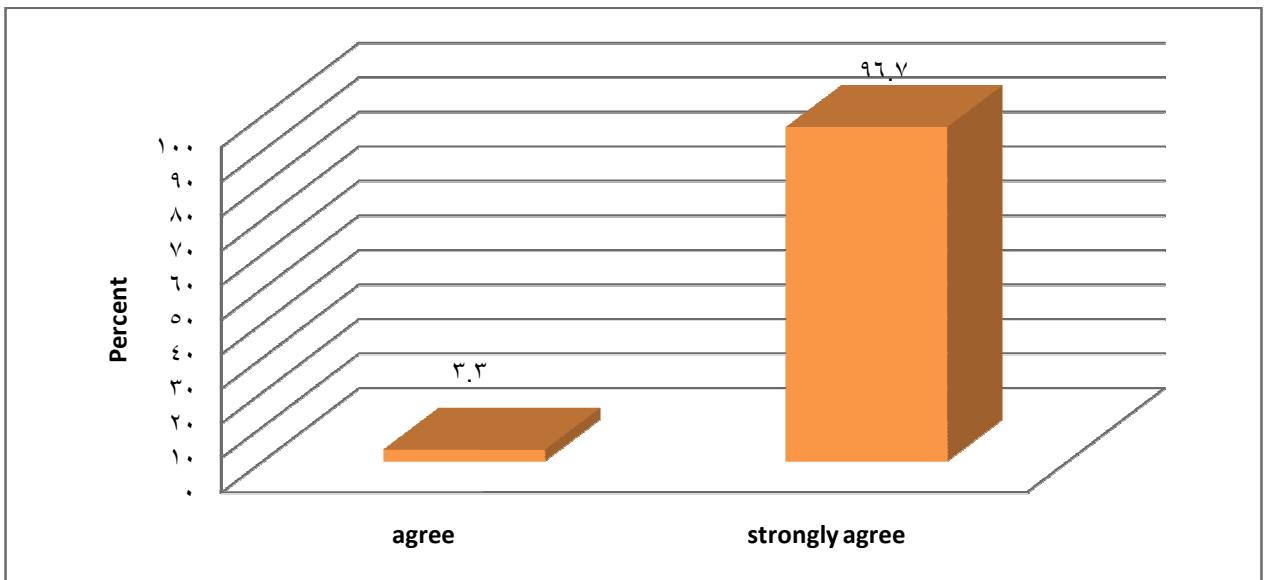


Figure: 4-31 motivate the employees, encourage them and have their attention to work to satisfy the needs of safety and security.

Test of hypothesis

**Source:** Results of the SPSS program. Table: 3-32 test of hypothesis (1).

There is a positive relationship between reducing waste of resources accidents and injuries and the application of the system OHSAS 18000.			
Chi-Square Test			
	Frequency	df	Sig
Agree	9	1	0.000
Strongly agree	201		
Total	210		

From the table above Chi square test was used to check first hypothesis (there is a positive correlation between the reduction of waste of resources, and accidents and injuries and the application of the requirements of the system OHSAS 18000) We note from the table above that sig equal to (0.000) is less than 0.05, which indicates that there is significant differences between the samples answers about the hypothesis in favor of the most frequent answer they strongly agree.

Significant (sig) equal 0.000 which is less than 0.05 Degree of freedom (df)

Table: 3-33 test of hypothesis (2). Source: Results of the SPSS program

There is a relationship between the overall objectives with regard to occupational safety and health and the application OHSAS 18000.			
Chi-Square Test			
	Frequency	df	sig
Agree	11	1	0.000
Strongly agree	199		
Total	210		

From the table above Chi square test was used to check second hypothesis (There is a relationship between the overall objectives with regard to occupational safety and

health and the application OHSAS 18000) We note from the table above that sig equal to (0.000) is less than 0.05, which indicates that there is significant differences between the samples answers about the hypothesis in favor of the most frequent answer they strongly agree. Significant (sig) equal 0.000 which is less than 0.05 Degree of freedom (df)

Table: 4-34 test of hypothesis (3).Source: Results of the SPSS program

3/ Safety oriented work force is positive factor for organization safety performance.			
Chi-Square Test			
	Frequency	df	Sig
Agree	9	1	0.000
Strongly agree	201		
Total	210		

From the table above Chi square test was used to check the third hypothesis (Safety oriented work force is positive factor for organization safety performance) We note from the table above that sig equal to (0.000) is less than 0.05, which indicates that there is significant differences between the samples answers about the hypothesis in favor of the most frequent answer they strongly agree.

Significant (sig) equal 0.000 which is less than 0.05 Degree of freedom (df)

Table: 4-35 test of hypothesis (4).Source: Results of the SPSS program

the close relation connection between efficient safety management and organization performance.			
Chi-Square Test			
	Frequency	df	Sig
Agree	12	1	0.000

Strongly agree	198		
Total	210		

From the table above Chi square test was used to check the Fourth hypothesis (the close relation connection between efficient safety management and organization performance) We note from the table above that sig equal to (0.000) is less than 0.05, which indicates that there is significant differences between the samples answers about the hypothesis in favor of the most frequent answer they strongly agree.

Significant (sig) equal 0.000 which is less than 0.05 Degree of freedom (df)

## 4-2 Discussion

Based on the literature review and objectives of the research was designed consists of four parts, according to the research hypotheses branches were chosen to assess the effectiveness of the application of the system in the enterprise:

The first hypothesis and the second to assess the effectiveness of the system OHSAS example of the sub- hypotheses ,to reduce wastage, protection procedures, and the installation of an emergency system should be applied. The commitment of senior management contributes to the application of occupational health and safety in the organization Amendments of the General system of the organization in line with OHSAS regulations help conserve resources; the organization's goals contain the general Framework of OHSAS

Third hypothesis to assess the culture of safety in the institution example of sub-hypotheses, Providing employees with the knowledge and equipment required performing their jobs efficiently increases occupational safety and health in the organization, Employees' awareness of safety requirements.

Hypothesis fourth assesses performance of the institution example of sub-hypotheses ,the efficiency safety system reduces the direct and indirect cost of accidents and also injuries, the connection between the methods of safety, occupational health, production management systems, services and technological processes applied to boost the efficiency of the organizations. The questionnaire was distributed between the staff and workers and technicians in the oil -producing company and the difficulty of access to them in their place has been dealt by the Department of Occupational Safety and Health who distributed the

questionnaire to their employees

the Answers showed the positive relationship of assumptions and by nearly 90 % for each assumption, and this bias is attributed to the following : -

1. The small sample size (30).
2. Questionnaire distributed in with director of safety and the environment and thus their answers were biased.
3. The high attention of the Management to training and the distribution of a culture of safety and occupational health workers led to biased to manage their interest in their section.

The proportion of this bias, the researcher work in telephone interview with some of the staff at the Department of Safety and Health Occupation and asked about the application system OHSAS18000, and the difference in the rates of decline in accidents before and after the application of the following themes:

- 1 . Rates of fire
2. Road accidents
3. Serious accidents

The following table shows the result of the record and interview analyses (Table 3-36) The rate of decline after the application

si		The rate of decline after the application
1	Rates of fire	50%
2	Road accidents	40%
3	Serious accidents	15%

The following was noted:

- 1 . The fires reduced by 50% as result of awareness and increase training aids and the existence of the necessary methods of fire and determine the responsibilities and emergency specific plans.
2. The road accidents reduced by training on safe driving and to identify specific speeds in each area.

3. Serious accidents reduced by training employees on the methods and ways of working safe and distribution of a culture of safety and attention to personal protective equipment .

**CHAPTER FIVE**  
**CONCLUSION AND RECOMMENDATION**

## 5.1 CONCLUSION

This study aims to examine the impact of the application of OHSAS 18000 in the oil industry in Sudan. It is well known that “safety begins at the top”. The management of an organization should control the whole process and combine the maximum production methods with the minimum cost. This process should be conveyed with regard to occupational health and safety because it should be kept in mind that safety is not an extra expenditure. On the contrary, it is a money saving process. The general improvement of occupational health and safety constitutes well-being and motivation of workers as well. This will obviously improve efficiency and quality of products. The consciousness of occupational health and safety provides a better way of life for both individuals and society. Health, safety, and the comfort of workers are a prerequisite for quality and efficiency. These primary matters are very important for socio-economic, egalitarian, and sustainable development. As a result, this study shows the following:

1. It is important to improve health and safety performance, and here of; the OHSAS 18000 standard series provide great benefits for oil industry.
2. Application of OHSAS18000 has direct influence in waste reduction and accident and injuries rate, waste result from the lack of training of workers, lack of maintenance of machinery and use poor raw materials. When applying the system OHSAS 18000 less mistakes as a result of training, awareness, raise the efficiency of workers so there are minimum rate in accident and injuries.
3. Application of OHSAS18000 must be consistent with over all organization objectives regarding OSH.
4. Safety oriented work force is positive factor for organization safety performance.
5. Efficiency of OHSAS management system has direct impact overall origination performance.



## 5.2 RECOMMENDATION:

1. Publication of protection culture reduces the wastage of resources in the organization.
2. The participation of employees in the preparation, implementation, development of internal regulations maintaining the Occupational Safety and Health contributes to resource conservation.
3. Must be the system of occupational safety and health is part of the general system of enterprise manager to development of the whole system of the institution.
4. Considering the safety as a system based on the use of scientific facts tend to reduces occupational exposures.
5. Reduction of accidents before they occur depends on identifying , assessment and control of Hazards..
6. To improve the efficiency of the safety system, the Procedures and applications of work must be applied
7. the connection between the methods of safety ,occupational health , production management systems, services and technological processes applied to boost the efficiency of the organization's
8. Instructing and publication of Occupational Safety and Health requirements is important to minimize the risks
9. The organization's goals must contain the general Framework of OHSAS.
10. Identifying roles and responsibilities, improve the performance of the safety system.
11. Recommended to study in the futures the performance of two companies one applying the OHSAS 18000 system and the other do not apply so as to come out clear results of the impact of the application in performance of the company.

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# APPENDICES