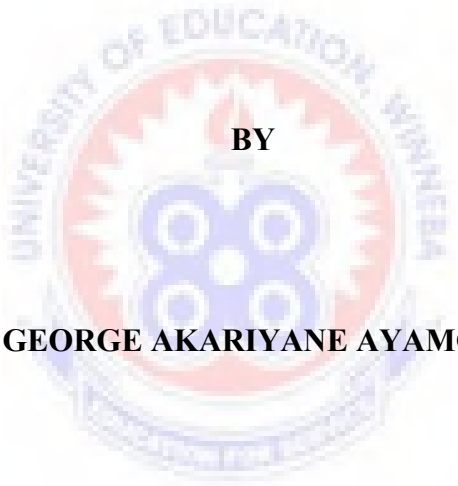
UNIVERSITY OF EDUCATION, WINNEBA

OCCUPATIONAL SAFETY MANAGEMENT IN MOTORCYCLE MECHANIC WORKSHOP IN BOLGATANGA MUNICIPALITY IN THE UPPER EAST REGION OF GHANA



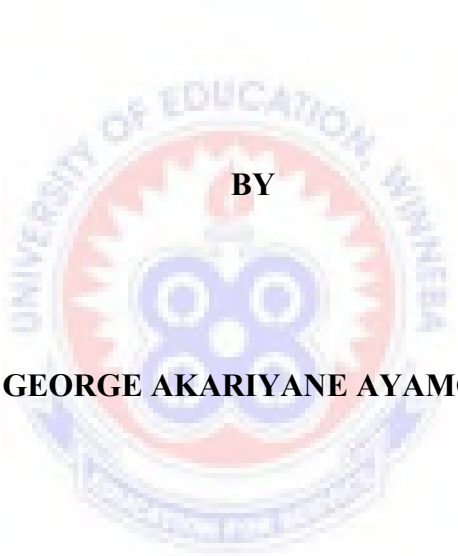
BY

GEORGE AKARIYANE AYAMGA

AUGUST, 2013

UNIVERSITY OF EDUCATION, WINNEBA

OCCUPATIONAL SAFETY MANAGEMENT IN MOTORCYCLE MECHANIC WORKSHOP IN BOLGATANGA MUNICIPALITY IN THE UPPER EAST REGION OF GHANA



BY

GEORGE AKARIYANE AYAMGA

A Dissertation in the Department of **MECHANICAL TECHNOLOY EDUCATION,** Faculty of **TECHNICAL EDUCATION,** submitted to the School of Graduate Studies, University of Education, Winneba in partial fulfillment of the requirements for the award of Master of Technology (Mechanical) degree

AUGUST, 2013

DECLARATION

CANDIDATE'S DECLARATION

I, GEORGE AKARIYANE AYAMGA, declare that this Dissertation, with the exception of quotations and references contained in the published works, have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for any other degree elsewhere.

SIGNATURE:……

DATE:……

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Dissertation as laid down by the University of Education, Winneba.

NAME: DR. JOSHUA AMPOFO

SIGNATURE:……

DATE:……

ACKNOWLEDGEMENT

My profound gratitude and thanks goes to the Almighty God for granting me knowledge, health, protection and guidance to come out with this research.

I also wish to express my sincere appreciation to my supervisor, Dr. Joshua Ampofo for his ideas, suggestions, through the time spent reading through the entire project throughout the writing process

I am also indebted to all lecturers of the Technology and design department of the University of Education, Winneba Kumasi Campus for their dedication and insight they gave to me during the entire programme

My profound gratitude also goes to all the respondents for their wonderful cooperation, patience and acceptance.

Finally, my thanks go to Madam Vida Atugiya, for typing this work and to Mr. Samuel Guanie for proof reading this thesis.

DEDICATION

This work is dedicated to my children; Isaac, Jeff and Juliana Ayamga

TABLE OF CONTENTS

CHAPTER ONE: INTRODUCTION

CHAPTER TWO: LITERATURE REVIEW

LIST OF FIGURES

LIST OF TABLES

LIST OF PICTURES

LIST OF ACROYMS AND ABBREVIATIONS

BS - British Standard

BSI - British Standard Institute

DFI -Department of Factories Inspectorate

GDP- Gross Domestic Product

ILO-International Labour Organization

NGO - Non Governmental Organization

OH&S - Occupational Health and Safety

OHSA- Occupational Health and Safety Act

PNDCL- Provisional National Defense Council Law

RTF- Rural Technology Facility

SPSS- Statistical Package for Social Sciences

WHO -World Health Organization

ABSTRACT

The study looked at how artisans in Bolgatanga Municipality managed safety in their workshops. The safety assessments were based on questionnaire and observation at the various workshops within the Municipality. Descriptive survey design was used for the study. A sample of 50 artisans was randomly selected. The data was analyzed using Statistical Package for Social Sciences (SPSS v16). The study revealed that, none of the artisans had the opportunity to attend any training, seminar or workshop on industrial safety. The findings revealed that all the artisans do not read instructional manual on new motorcycle before repairs. Furthermore, none of the artisans (100%) reported accidents cases that happened in their workshops. The study again revealed that 60 % of the respondents charged GH¢20 as the cost of major repairs, 66% charged GH¢2 as minor repairs whiles 50% charged GH¢20 for assembling a new motorcycle. The artisans had no association to regulate their activities. It was recommended that a branch of the Department of Factories Inspectorate (DFI) should be opened in Bolgatanga to help check the activities of artisans in the industrial area. Also the Department of Factories Inspectorate (DFI) could collaborate with institutions such as the Rural Technology Facility (RTF), and Asungtaaba Women's Association locally base NGOs to organize training, seminars or workshops on industrial safety for the artisans in the Municipality.

CHAPTER ONE

Background to study

Motorcycles are small light-weight performance oriented vehicles that have become a popular means of transportation in the world including African countries. They are affordable, easy to manoeuvre and consume less fuel. They also have shorter acceleration and transit time, reduced passenger capacity, high power to weight ratio and intuitive steering. These features according to Lee (2007) provide freedom in a traffic stream and cause some characteristics behaviour patterns in mixed traffic flow. Gbadamosi (2006) found that motorcycles generally present more complex behaviour than passenger cars do; exhibit more erratic and chaotic trajectories when making progress and do not always follow the lane disciplines strictly. This behavioural pattern has also been observed among motorcycle operators in Ghana.

Lack of available safety equipment such as seat belts and air bags makes motorcycle riding dangerous compare to automobile driving. Statistics show that motorcycle riders are much more likely to have a serious accident than people who drive cars (David, 2004). Also, in the event of crash/accident motorcyclists are much more likely to come into direct contact with the many hard and abrasive surfaces in the road environment than most other road users (Wishart and Watson and Rowden, 2009).

With the rapid increase in motor vehicle usage in low and middle-income countries, road traffic related deaths and injuries are increasing sharply (Murray and Lopez 1996). Projections made by Harvard School of Public Health on behalf of the World Health Organization and World Bank Show that from 2000 to 2020, road traffic deaths will decline by about 30% in high-income countries but will increase substantially in low-and middle-income countries.

In Ghana especially in the three Northern Regions, the population of motorcycles on the roads has also increased rapidly and accidents have become so rampant that there is no single day without accidents being recorded. Some people are tempted to believe that apart from malaria the second killer is the motorcycle. It is sad to know that professionals including teachers, artisans and security personnel who are bread winners of their families and contribute to national development have lost their lives, or deformed in one way or the other through motorcycle accidents. For example, Akufaar (2009) found that from 2004 to 2008, 1211 motorcyclists were involved in crashes in Northern Ghana. In this figure, 288 motorcyclists were killed, 577 were seriously injured and the remaining 346 were slightly injured.

Motorcycle accidents are one of the most serious of all motor vehicle accidents. These accidents occur as a result of over-speeding, unnecessary over-taking, over-loading, inexperienced and drunken riding, mechanical faults, bad roads and weather conditions, mistakes from pedestrians, crossing animal and so on.

Since 1950, the International Labour Organization (ILO) and the World Health Organization (WHO) have shared a common definition of occupational health. It was adopted by the Joint ILO/WHO Committee on Occupational Health at its first session in 1950 and revised at its twelfth session in 1995. The definition reads: "Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job.

"The main focus in occupational health is on three different objectives: (i) the maintenance and promotion of workers' health and working capacity; (ii) the improvement of working environment and work to become conducive to safety and health and (iii) development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings. The concept of working culture is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned. Such a culture is reflected in practice in the managerial systems, personnel policy, principles for participation, training policies and quality management of the undertaking."

In 2001, the International Labor Organization (ILO) published ILO-OSH 2001, also titled "Guidelines on occupational safety and health management systems" to assist organizations with introducing occupational safety and health systems. These guidelines encourage continual improvement in employee health and safety, achieved via a constant process of policy, organization, planning & implementation, evaluation, and action for improvement, all supported by constant auditing to determine the success of occupational safety and health actions.

The ILO management system was created to assist employers to keep pace with rapidly shifting and competitive industrial environments. The ILO recognizes that national legislation is essential, but sometimes insufficient on its own to address the challenges faced by industry, and therefore elected to ensure free and open distribution of administrative tools in the form of occupational health and safety management system guidance for everyone. This open access forum is intended to provide the tools for industry to create safe and healthy working environments and foster positive safety cultures within the organizations.

The rapid, constant development of technologies, the changing conditions of work, new work organization and work practices that are being introduced into the work environment, has increased the complexity of methods within many of the industries. Hence, the world becomes increasingly complicated in technology. These complex systems require a tight combination between technical and human subsystems (Wiegmann et al., 2002, as cited in Maryam, 2009, p.161). Simultaneously, the accidents that occur in workplaces have also become more complex and in some cases, more frequent.

In fact, increased technological dependence has led to bigger accidents, involving more people, and greater damage to property and the environment, (Blackett 2005, as cited in Zimolong & Elke, 2006). It has become clear that such exposure does not originate from just human error, technological failures, or environmental factors alone. Rather, it is the fixed organizational policies and standards, which have repeatedly been shown to predate the misfortune. Therefore, safety experts in recent years have begun to focus on the organizational values that might enhance risk and crisis management and safe performance in industries. Bambang (2010) put it that at the global level, according to the most recent estimates of the International Labour Organization (ILO), about two million people die because of their work every year. These work related deaths represent only a small fraction of the suffering caused. An estimated 160 million people have work-related diseases. Some 355,000 fatal accidents take place every year.

For every fatal accident at work, some 500–2,000 other non-fatal injuries occur, depending on the type of work. Yet these workplace tragedies rarely make the headlines. Fatalities and accidents in work places are not bound to happen; they are caused.

It is estimated that, the Bolgatanga Municipality loses about $1.2 million annually due to motorcycle crashes, according to a study conducted by some health and educational institutions in Ghana.

They are the Pharmacy Council, School of Public Health, College of Health Sciences, University of Ghana and the Upper East Regional Health Directorate. The study showed that 52 percent of the estimates were accidents -related cost, including property damage and administration, while 48 percent covered casualty- related cost, including medical expenses, out-of -pocket expenses, lost of labour output, intangible cost and funeral expenses. The study also indicated that 98 percent of vehicle registered in the Municipality between 2004 and 2008 were motorcycles and crashes involved mainly young males. According to the study, motorcycle accidents were one of the ten (10) causes of mortality in the Municipality with an average of six victims reporting to the Bolgatanga Regional Hospital every day. According to the study, 54 people died in 2009, 45 died in 2010, 54 died in 2011, and 31 died as at June this year (2013) in the Municipality due to motorcycle crashes.

In general, most artisans as well as industries in Ghana do not comply with established occupational safety procedures and policies. However, most accidents and events in Bolgatanga motorcycle workshops are direct results of lack of knowledge of safety, adhering to the established safety procedures, as well as lack of risk management, strong safety culture, safe working conditions, and employees safe work attitudes, perceptions and actions. Thus, the participation of all employees including managers and non managers is vital in policy making, establishing and implementing a feedback system that drives towards a continuous safety improvement in industrial workshops to achieve a successful safety programme.

The International Labour Organization (ILO) is currently campaigning for the provision of decent work worldwide. It is clear that those decent jobs must also be safe jobs. It must be

mentioned that safe management has an important role to play in reducing occupational accidents in workshops and engineering as a whole. The current situation of safety in motorcycle workshops within Bolgatanga Municipality shows that there is the urgent need for education on occupational safety and management programs for artisans. Workplace safety and hazard prevention are the responsibility of everybody ie employees, employers, artisans and apprentices. By doing this, they keep themselves and others working around them safe.

The Problem Statement

Occupational safety and health is of worldwide concern to governments, employers, workers and their families. While some industries are inherently more hazardous than others, groups such as migrants or other marginalized workers are often more at risk of experiencing work-related accidents (Makela, 2008). Safety management as a shared responsibility of every employer and employee is one of the most important aspects that needs to be taken seriously in every aspect of our life and every institution, especially industries. The leaders at different levels of organization are thus seen as responsible for promoting safety among employees. When accidents or injuries occur, one looks to the leaders to find the root of the problems. Human behaviour and socio-technic interaction are also common reasons for accidents and injuries, but the main focus is on safety management (Heinrich, 1931, as cited in Anne-Catherine, 1990). It is believed that when safety is not properly managed it may lead to risk, and when risk is not properly handled it develops into accident.

The protection of workers from risk and injury is a major problem in every country in the world. Governments and safety engineers are making efforts through laws and regulations so that better protection is provided for the workers who are at risk from industrial injuries. It is essential and part of industrial managers' responsibility to provide factory safety rules and regulations in the form of training to the workers to become skilled workers. This is very

important because, by government laws, employers and employees have to observe the health and safety issues at work acts or factory safety acts to help safeguard industrial safety, accidents and hazards since every work has its associated risk and safety measures to be taken.

There is a perception that industrial accidents and health hazards occur very frequently in the mechanical workshops of which motorcycle workshops in Bolgatanga are not an exception. This is because of lack of knowledge in factory safety acts, new machines and technological development, which is affecting their operations drastically. When accident occurs, people can lose their lives or become incapacitated, and thus has adverse effect on the nation in general and the industrial sector in particular. In fact, increased technological dependence has led to increased accidents, involving more people, and greater damage to property and the environment. This research will investigate how safety management in motorcycle workshops are observed to minimize industrial accidents and hazards irrespective of the size of the machine shop.

Purpose of the Study

The aim of the study was to find out the level of observance of safety rules and regulations at motorcycle workshops within Bolgatanga Municipality. To this end, the study will enable the researcher to come out with the following:

- Assess educational levels of the artisans (motorcycle mechanics) in motorcycle workshops within Bolgatanga Municipality.
- Assess attitude of artisans towards safety procedures, which creates safe, healthy, and accident free atmosphere at the workplace.
- Determine the perceptions of artisans about the causes and effects of industrial accidents
- Assess whether education and training activities to promote safety management in motorcycle workshops within Bolgatanga Municipality are enforced by Factory Inspectors.

Research Questions

In order to achieve a comprehensive study, questions were used as a guide in order to arrive at a decisive conclusion. The following research questions were therefore formulated.

- What are the educational levels of motorcycle mechanics in Bolgatanga Municipality?
- What are the attitudes of motorcycle mechanics towards safety management in motorcycle workshops in Bolgatanga Municipality?
- What are the causes of accidents and their effects in motorcycle workshops in Bolgatanga Municipality?
- What are the attitudes of the artisans in the motorcycle workshops towards the observation of industrial safety rules and regulations?

Significance of the Study

The following were the significance of the study.

- It will serve as a guide for instructions in the motorcycle workshops to educate artisans about the appropriate safety management practices.
- The findings of this study can help provide artisans information about how safety rules and regulations are observed in motorcycle workshops.
- The study can also provide the Department of Factories Inspectorate information about the causes of industrial accidents, how the artisans observed safety rules and regulations in motorcycle workshops in Bolgatanga Municipality.

- The study will help policy makers to come out with future educational policies in order to reduce workshop accidents.

Study Area

Bolgatanga is the district capital of the Upper East Region of Ghana. The roads are always occupied by people with different models of motorcycle for the purpose of riding to their work place, sending their wards to school, going to clubs, funerals and outdooring for socialization and so on. The road network is bad and lack shoulders and walks ways for bicycle riders and pedestrians.

Motorcycles are the most commonly used means of transport in Bolgatanga because they are affordable, economical to maintain and can also be used on any terrain eg footpaths compare to cars. The other reasons why the people of Bolgatanga use motorcycle are perhaps poverty. The people are predominantly peasant farmers and petty traders and therefore cannot afford to buy cars and maintain them.

The various kinds of motorcycles use in the district are Honda, Suzuki, Kawasaki, Asponic, Hadjin, Super Access, Yamaha, Sukida, Yorobo, Luojia, Motorking and so on.

Due to the emerging technological trend in motorcycles, there is the need to study this particular transportation segment to contribute to research in Transport Management and Engineering.

Limitations of the Study

The researcher encountered the following limitations during the study:

Lack of co-operation from respondents as they thought the study was a political exercise and therefore demanded money before they answered the questionnaire.

Scope of the Study

The study focused only on motorcycle mechanics workshops within Bolgatanga Municipality. Majority of these workshops were small in size with an average of three to five apprentices and their masters.

CHAPTER TWO

LITERATURE REVIEW

This chapter reviews literature on occupational safety management in motorcycle workshops. In order to do this, it is essential to review literature from published and unpublished books, internet, journals and other relevant information on the research topic.

The following were the main headings discussed:

- Education and Training
- Attitudes
- Work Equipment and Hazards
- Causes of Accidents and Effects
- Knowledge of Safety

Education and Training

Education is considered the master key that can effectively alleviate poverty, promote peace, conserve the environment, improve the quality of life for all and help achieved sustainable development. It is in the light of this that, the colonial government showed interest in education when in 1882 and 1887, it passed Educational Ordinances which respectively, provided for the

setting up of industrial schools in all the important towns and made education compulsory in all school in Ghana (Annoh, 2001).

According to Mukala (2009), the aim of training is to bring expertise and skilled persons to the field of Occupational Health and Safety and thus build up the productivity of the country, thus reducing poverty and increasing employment. The best way to increase awareness on occupational safety management is training, which should be included in all forms of education, eg formal, informal and non formal education. Personnel injured at work often lack the information, knowledge, and skills required to protect themselves. An effective training programme will result in increased efficiency and productivity.

Educational Requirements

The educational requirements of every job are as varied as the jobs themselves. Some of the different education training grounds are as follows:

College: Many jobs require a four -year college degree. Workers in manufacturing management, finances and marketing often have college degrees in the fields of Management, Industrial Relations, Business, Accounting and Computer Science. Engineers and other professional such as Scientists have college degrees that require broader Mathematics and Science training. Many technicians can receive a two -year college degree (associate's degree). Because technicians carry themselves with engineers, their two years of education filled with hands-on technical courses and the Mathematics and Science courses needed to understand the basics of engineering.

Technical School: Many skilled and semi-skilled workers receive their educational training through a high school or post-secondary, vocational or technical school. The programme length varies with the school and the particular technical area. Programmes can run from several months to several years.

Apprenticeship Training: Skilled workers usually must complete an apprenticeship-training programme. As apprentices, they work with skilled craftspeople on the job to learn specific skills. They also take classes that supply the knowledge base needed.

On the-Job Training: Semi-skilled workers get their training on the job. This is because most of the jobs do not require a higher degree of skills that would take years to learn (Komacek, Anne & Horton, 1997).

Future Educational Requirements

With the increased use of new complex computer, robotic and automation technologies, many more jobs in manufacturing require some sort of education beyond high school (Komacek et al., 1997).Therefore it is important for every employer and employee to train their work force to be skillful, knowledgeable and to stand the test of time. This will also improve quality of work, productivity, above all reduce the incidence of accidents and enhance risk and safety awareness.

Attitudes

According to Wortman et al. (1992), attitudes are the thoughts and feelings that encourage us to act as if we like or dislike something. Sometimes, people dismiss attitudes as unimportant, but attitude can be a matter of life or death. People's attitudes towards diet, exercise, drinking and smoking, using seatbelts and having safe sex affect how long and well they are fit to live.

Attitude is a way of thinking or behaving. Workers must develop good attitudes toward safety. This means that, they would have strong feeling towards the importance of safety and are willing to give time and attention to learning the safest way to perform their work. It means that you will be certain to work carefully and follow safety rules and regulations. A safe attitude will protect the worker and others. If workers follow the rules and directions carefully, many of them

will soon adopt safety habit that they will perform almost automatically (Wagner and Kicklighter 1991).

One need to know the safety practices to follow in the workshop. Using this knowledge will help one to produce quality products efficiently and one's safety is therefore assured. Good attitudes make a person much safer and working safely is a protection for the worker.

Work Equipment and Hazards

Work equipment is defined as any machine, apparatus, tool or installation used at the work place. This covers all types of work equipment from the largest machine to the smallest hand tool. Lifting equipments are also considered as work equipment. Where lifting equipment is used, employers must ensure that safe lifting loads are clearly marked on machinery and adhered to by staff in order to guard against injury/fatality to the user or their colleagues. Vehicle lifting tables, ropes, lifting tackle, chains and cranes are all examples of lifting equipment.

Work equipment can cause entrapment, impact, contact, entanglement and ejection in the workshop. Knowledge of occupational safety rules and regulations will help reduce work equipment related injuries

Type of Hazards

Hazard means anything that can cause harm (e.g. chemicals, electricity and working while on ladders (Herman and Jeffress, 1999). Hodson (1992) defines hazard as a condition, which has the potential to cause injury, damage to equipment or facilities, loss of material or property, or a decrease in the capability to perform a prescribed function

The following are the various types of hazards:

- Mechanical hazards
- Non-mechanical hazards and
- Control hazards.

- **Mechanical hazards:** They include traps, impacts, contact with moving parts, entanglement or through the ejection of materials or machine parts due to structural failure or incorrect operation and housekeeping.
- **Non-mechanical/Physical hazard:** They include operator (human) error, corruption of software, faulty programming of computer-controlled systems, and failure of computer-controlled systems

Definitions of Accident

An occupational accident is an unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work, which results in one or more workers incurring a personal injury, disease or death. Occupational accidents can also be considered as travel, transport or road traffic accidents in which workers are injured and which arise out of or in the course of work, i.e. while engaged in an economic activity, or at work, or carrying on the business of the employer, International labour organization ILO (1998).

The Royal Society for the Prevention of Accidents of the United Kingdom defines an accident as any unforeseen, adverse event causing harm or having the potential to cause harm Kiwekete (2009,p.13). From this definition, accident is any hazard that can cause harm to people and equipment.

The development and application of management systems standards, such as the British Standard Institute (BSI) and Occupational health and safety Acts (OHSAS) 18001:2007, Occupational health and safety (OH&S) management systems requirements, require the top

management of organizations to outline an OH&S structure committed to the prevention of accidents and ill health in the workplace.

Types of Accidents

Chapman (1979) grouped industrial accidents into: mechanical, non-mechanical and electrical accidents.

Mechanical Accidents: These are accidents caused by moving or rotating parts of machinery, which are guarded. It is the responsibility of the management to provide safety. Safety Act (Act 328) states that every part of transmission machinery and every dangerous part of any other machinery must be securely fenced unless it is in such a position or of such construction as to be safe to every person.

Shafts, rotating projections such a bolts and key heads, conveyor belts, power transmission belts, pulleys, gears, spindles and any part of machines, which could catch loose, flapping clothing of passers-by or the operator and part deemed to be dangerous must be provided with some types of guard.

Non-mechanical Accidents: These are not caused by any moving parts of machinery. Situations such as fall, either from slippery floors or from heights because of the use of bad condition of ladders and working platforms and so on are examples of non-mechanical accidents. Badly fitting spanners may slip with disastrous results to the knuckle, the user should make sure that the spanner fits very well before exerting load on to it. A loose file shaft or file may result in the

spike at the end of a file being driven into the hand on piercing the palm during filling. “Safety-first” habit should be cultivated.

Electrical Accidents: Electricity is particularly a hazardous medium in that the danger involved is commonly the danger of death. Electrical hazards to human being may result in electric shock, direct shock, direct burns, or secondary injury form non-lethal shocks. To property, it may result in fire outbreaks or explosions (either of which can cause human injury).

Causes of Accidents

Zimolong and Elke (2006) categorized the causes of accidents as:

- Unsafe Acts and Unsafe Condition; Overconfidence, Carelessness
- Inattentiveness
- Inexperience and Attitude

Unsafe Acts and Unsafe Conditions

Most accidents happen because people commit active failures, which are called "unsafe acts". Not wearing safety glasses is one example. In terms of system safety, unsafe acts and unsafe conditions are substandard practices and substandard conditions, that is, deviation from an accepted standard or practice. A vast number of substandard conditions involve poor ergonomic design of machine, equipment and the work environment. Incidents usually start with relatively insignificant and common failures of design, operating and maintaining of equipment, with human errors or degraded performance. In combination with circumstances and the reactions of equipment and people, hazards can be released and escalate to cause injuries or damage to environment and assets. The prevention of unsafe acts and conditions to minimize incidents will be quite troublesome if their systemic nature is overlooked. They are not random events, but logical and systematic consequences of psychological states. Examples are lack of attention,

haste, inexperience, reasoning errors and misperceived risk. Psychological states are again not random events. They are caused by latent errors related to managerial and organizational failures and omissions; errors made long before the accident, and which have been present all the time. "Haste may be caused by any one of the following: too rigorous planning, a reward system that stresses speed, lack of personnel, frequent breakdown of equipment, a motivation to complete more than the normal portion of work, exceptional emergencies that had never been foreseen" (Wagenaar, Souverijn & Hudson, 1993, as cited in Zimolong & Elke, 2006).

Furthermore, accidents are caused by a combination of circumstances and events, usually resulting from unsafe work acts and an unsafe work environment or both.

Certain acts of people put them or others at risk or cause accidents. It has been estimated that unsafe personal acts cause as much as eighty percent (80%) of organizational accidents. Unsafe personal acts include such things as taking unnecessary risk, horseplay, failing to wear protective equipment, using improper tools and equipment and taking unsafe shortcuts, tiredness, increased rate of production (Lloyd & Rue, 1992).

It is difficult to determine why employees commit unsafe personal acts. Fatigue, haste, boredom, stress, poor eyesight and daydreaming are all potential reasons. Most employees think of accidents as always happening to someone else, such an attitude can easily lead to carelessness or underestimating what can happen.

Research studies have also shown that employees with positive attitude have fewer accidents than happen in all types of environment. It can happen at homes, in offices, parking lots, market places, factories and so on. There are, however, certain work conditions that seem to result in more accidents. Such unsafe conditions in the work environment include the following: unguarded or improperly guarded machine parts (spindles, belts, pulleys, shafts and so on), poor housekeeping (such as congested aisles, duty or wet floors, improper stacking of materials).

Defective tools and equipment, poor lighting, poor ventilation, improper dress (such as wearing of cloths with loose and floppy sleeves) when working on a machine that has rotating parts and sharp edges.

Another reason often given for accidents is that certain people are accident-prone. Some employees due to their physical and mental make-up are more susceptible to accidents. This condition may result from inborn traits, but it often develops because of an individual's environment. However, this tendency should not be used to justify an accident. Given the right set of circumstances, anyone can have an accident. For example, an employee who was up all night with a sick child might well be accident-prone the next day.

Graham and Bennett (1992) opined that the concept of accident proneness emerged from studies done in munitions factories during 1914-1918 war. According to them, certain employees are inherently likely to be involved in accidents more than others are and are termed accident-prone.

This assertion or finding was not always confirmed by later research. For instance, workers appear to be safe during one period and unsafe or accident-prone in another and vice versa. The later research result seems to suggest that the ability to accidents involvement is due more to chance factor and the behavior of others than to inherent quality in the worker. Another view is that even the same workers have proneness to accidents at different periods, only when the jobs remain unchanged.

Accident proneness was therefore thought of because of the interaction between the worker and his job. Thus, the existence of accident proneness at all would be due to unsuitability for the job, or lack of training in it and temporary factors, for example, frustration, worry or ill health.

Work schedule refers to the length of time one spends on doing a particular job and the period of the day work is done. After working on a particular job for six hours, subsequent working hours could lead to accident. The rate of accident is proportional to the number of extra hours. Graham and Bennett (1992) attribute it to fatigue and partly to the fact that accidents occurs more often during night shifts.

Safety experts and managers have come to realize that it is not possible to eliminate accidents occurrence by simply reducing unsafe working conditions. The reason was that the employees themselves could cause accidents, irrespective of precautions that have been taken by management to make the work place safe. Some writers trace the cause of unsafe acts to personality trait (McCormick & Tiffin, 1971), revealed that personal characteristics such as personality, motivation and other serve as the basis for certain behaviour tendencies, such as tendency to take risks, attitudes and lack of attention. All these increase the probability of a person to fall victim to accident.

Cascio (1992) reported that accidents often resulted from interaction of unsafe conditions and unsafe acts. Thus, if a particular operation forces a worker to lift a heavy part and twist to set it on a bench, then the operation itself forces the worker to perform the unsafe act. Telling the worker not to lift and twist at the same time will not solve the problem. The unsafe condition itself must be corrected, either by redesigning the flow of material or by providing the worker with a mechanical device for lifting. To eliminate or at least to reduce the number and severity of work place accidents, a combination of management and engineering controls is essential.

Cost of Accident

After an accident, the total losses incurred because of that particular accident are assessed. Losses, which adversely affect the organization's profit directly, include idle time of workers and machinery, human injuries, damage to equipment because of the accident, worker's

compensation, payment for loss of life or for serious injury and the medical expenses of the injury. The total losses due to accidents are calculated by summing up to the direct and indirect costs.

Direct Cost (visible) could be seen at the site of the accident. It is usually obvious whether a worker is seriously injured or equipment badly damaged. Expenses consist of repairing equipment, or replacing the damaged machine and the compensation given to the victim.

Indirect Cost (invisible costs) are the side effects, which are not directly assessed since the losses on question are invisible and affect the injured or the family of the deceased worker, and the workplace indirectly. These invisible costs include: valuable time lost by co-workers, the value of production lost, time that administrative officers and others use to investigate the accident cases, time and money spent on the injured person and hospital expense, non-availability of the plant, its accessories and others, wages paid to other workers for fixing equipment damaged by the accident. Accident studies have shown that invisible costs are five to eight times higher than the visible costs, Amweelo (2000).

Reporting of Accidents and Hazards

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (1995) place duties on employers and the self-employed to report certain incidents, which occur in the course of work. The enforcing authorities to identify trends in incident occurrence on a national basis use these reports. The reports also bring to the attention of the enforcing authorities serious incidents, which they may wish to investigate (Ridley & Channing, 2004).

According to the 2003 Labour Act 651 part xv section 120, Regulation on the Health and Safety of Employees at Work, all occupational accidents other than road traffic accidents are to be reported to the Ministry of Labour. Occupational accidents are reported to the Factories Inspectorate in the Ministry of Labour for the purposes of establishing their causes. Therefore,

that appropriate measures to prevent recurrence in the future could be worked out. Reportable accidents should be reported as soon as practicable as and not later than seven days from the day of the accident.

Accident reports to the Department of Factories Inspectorate (DFI) have been inaccurate for the following reasons: employers have not been reporting all accidents as requirements. This also applies to new factories, where management fails to consult the DFI. Some employers too tend to report only very serious accidents whilst delay in reporting accidents cause inaccuracies in both the quarterly and the annual statistics for any particular year.

Accident Investigation

The purposes of investigating accidents are to collect required information for reporting to the enforcing authorities, to establish where the fault lies, to obtain information required to either pursue or defend a claim for damages and to obtain necessary information to prevent recurrence. Whilst thorough investigation would result in the collections of required information to satisfy the mentioned reasons, this is not the case in practice. For instance, if the primary purpose were to collect the required information for notification, then the investigation would usually be stopped when the relevant information is obtained whether or not if the information includes the required information for the prevention of recurrence. Conversely, if the primary purpose were to establish where fault lay or who was responsible, then there would be additional problem in that the investigation then becomes advisable and leads to biases in data collection. The ideal investigation should therefore be neutral with respect to fault and should have the primary purpose of obtaining information necessary to prevent recurrence.

Basically, two types of information are collected in all accident investigations. Firstly, information on what happened. This is usually factual and has limited scope for interpretation.

Such information as date and time of accident and what caused the injury, damage or other loss. The second type covers why the accident happened, this meant to ascertain the causes of the incident, which is more difficult to identify and thus more open to interpretation (Ridley & Channing, 2004).

This is a systematic approach to identify hazards and prevent accidents before they re-occur. In process, the safety engineer (or safety committee) compiles accident reports and includes information such as persons injured, time and place of the accident, nature and severity of the injuries, equipment involved, nature of the work and causes as noted by witnesses, supervisor and injured person. The safety engineer personally investigates serious accidents, analyses the reports and statistics as a guide to prevention since the information reveals point of danger and suggests remedial measures. Accidents may be caused by unsafe conditions (environmental cause) such as inadequate machine guard, improper construction designs hazardous processes, poor illumination, unsafe clothing and so on. More often, the cause would be due to equipment, overloading of machines, failure to use protective devices, or horseplay. Depending on the seriousness of the event, some basic guidelines are summarized below:

a. There should be no fixing of blame for an accident, but merely stating the causes. This guideline is essential. In order to obtain facts, communication between worker, supervisors, and informed employees must be opened.

b. The investigator must be factual as far as possible in specifying the causes. This guideline is particularly useful if opinions vary. Extra care should be taken to obtain the views of everyone involved in the accident or near the accident site.

This guideline deals with determining the causes of the accident. These causes are either unsafe conditions or unsafe acts. If primary and secondary causes are known, the next step is to implement the suggested corrective measures to eliminate the affecting factors.

Knowledge of Safety

Safety is the way of ensuring that the artisan/craftsman and his/her equipment and environment are protected. Knowledge is a basic input necessary for any manufacturing enterprise to succeed. The modern safety movement in industry, started around 1912 with the first cooperative safety congress and the organization of the National Safety Council in United States of America (U.S.A.). From 1912 to the present time, remarkable advances have been made in reducing the rate and severity of accidents. The importance of industrial safety was realized because every year millions of industrial accidents occur which result in either death or in temporary and disablement of employees and involve a good amount of cost such as resulting from wasted man hours, machine hours and so on.

In 1952 in U.S.A., fifteen thousand workers were killed in industrial accidents, 2,000,000 were injured and the total cost of these accidents was about $2,900,000,000. Loss of lives and accidents cost gradually led to the formation of Factories Act, Office, Shops and Railway Premise Act (Khanna, 2009).

According to Pavan and Muchiri (2010), work-related accidents and diseases continue to have serious consequences, with an estimated 2.3 million fatalities per year and economic losses of 4% of global GDP.

There are many kinds of knowledge. Advances in science and technology have had the greatest impact on the information base for manufacturing. Tools, machines, and processes have all changed dramatically since the Industrial Revolution. They continue to do so. Workers must have some knowledge of the tools of their trade and any materials and processes they use. This

knowledge is gained through formal education like high schools, vocational and trade schools and colleges. They can also gain information through on-the-job training.

Industrial safety should be a primary concern for all manufacturers. It is achieved by providing the safest possible environment and maintaining strict safety behaviour of employees. Both these goals take knowledge on the part of employers and employees.

The employers' job is to provide a safe working environment for employees and to encourage safe work habits. The employees' job is to work safely. Knowledge of the hazards associated with the jobs is an essential part of any safety training. Most manufacturing companies have co-ordinated safety programmes.

Most successful safety programmes have the following components:

a) Educating employees to be alert to hazardous conditions. This knowledge is often specific and might not come automatically to workers
b) Co-coordinating safety and engineering principles when designing or installing new job equipment. Jobs should be designed with safety in mind.
c) Encouraging workers and management to have a positive attitude about safety through safety meetings, safety posters, safety movies and bonuses.
d) Support from all levels of management. This includes willingness to enforce safety rules (Komacek, Lawson & Horton, 1997).

.

Safety and Warning Signs

Safety symbols are all around us in the world. It is important to know what they signify because they are in place to keep you and others safe.

Safety signs and warning signs consist of non-traffic-related notifying text, symbols and background. They are designed to inform the reader of potential hazards or dangers usually printed on a rigid or semi-rigid material. Safety signs and warning signs are typically mounted on a wall or a container in proximity to or containing a potentially dangerous object or material. Safety signs and warning signs are typically printed on rigid or flexible materials, then mounted or placed in the area of concern. Rigid safety signs and warning signs may be printed or engraved on metal or plastic unit that are mechanically attached to a product with a fastener or adhesive, whereas flexible signs are usually adhesive-backed. Safety signs and warning signs are often printed with bright or fluorescent colours to maximize visibility.

According to Killeen, Hollyer and Macminn (1999), safety signs and warning signs are typically pasted on jobsites, worksites, municipal areas, but safety signs and warning signs may be displayed anywhere that people need to be notified or protected. They are typically classified by the manufacturer by its make, colour, size, language, adhesiveness, or non-adhesiveness and the format of the matter of the label. Safety labels and warning labels are classified according to their functionalities as well. Safety signs and warning signs may cover an extraordinarily wide range of subjects, such as electrical equipment hazards, battery storage, or high voltage. Others recommend use of head, eye, or ear protection. Some safety signs and warning signs alert the reader to laser, burn, static, or grounding hazards; step and slipping hazards, crane hazards, forklift safety and conveyor use. Safety signs and warning signs also provide notification of

compliance with OSHA regulations and against hazardous materials like asbestos, pesticides, biohazards, carcinogens and flammable or explosive materials. Safety signs and warning signs may have different uses depending on the location; they are often used in a variety of jobsites and workplaces, including laboratories, medical fields and any other area where caution of hazards may occur (Killeen et al., 1999).

A safety sign is a sign (emblem) combining geometrical shape, colour and pictorial symbol to provide specific health or safety information or instruction. It must comply with BS 5378, which specifies colorimetric properties and dimension. Most people try to read safety signs. Nevertheless, even the shape of these signs can tell you a message without the words. There are three main classes of safety signs namely: regulatory signs, warning signs and informational signs. Regulatory signs are mandatory or prohibitory. The mandatory signs are strictly abided by to ensure safety, examples, 'No entry'. The sign states what protective equipment must be worn. The informational signs include emergency sign, which indicate safe conditions such as emergency routes (EnTra, 1989).

Zimolong and Elke (2006) outlined the following advantages of Safety Sign as follows:

- it gives the information required to execute a task and
- the information required to keep existing risks under control.

They emphasize the need for establishing signs, warnings, introducing personal counseling, training and qualification efforts. As Hoyos, Bernhardt, Hirsch, and Arnhold (1991, as cited in Zimolong & Elke, 2006) have demonstrated, employees have little knowledge of hazards, safety rules and proper personal protective behaviour. In some cases (16.1%) of signs and warnings support perception of hazards usually, however, people rely on knowledge, training and work experience. It is without doubt mandatory to improve the indication of hazards and risks by warning signs and labels. The use of labels and warnings to combat potential

hazards, however, is a controversial procedure for managing risks. Too often, they are seen as a way for manufacturers to avoid responsibility for unreasonably risky products. Obviously, labels and warning signs will be successful only if the information they contain is read and understood by members of the intended group of people. Frantz and Rhoades (1993, as cited in Zimolong & Elke, 2006) found out that 40% of clerical personnel a filing cabinet noticed a warning label placed on the top drawer of the cabinet; 33% read part of it and no one read the entire label.

The Occupational Safety and Health Act

The purpose of this Act is to ensure as far as possible every worker in the nation safe and healthy working conditions and to preserve human resources. Its coverage is equally ambitious, for the law extends to any business (regardless of size) that affects interstate commerce. Since almost any business affects interstate commerce, then all businesses are included.

United States legislative intervention has existed continuously for over hundred years in the area of health and safety. The Congress passed the Occupational Safety and Health Act in 1970. Its purpose was to assure as far as possible, every working man and woman in the nation safe and healthful working conditions and to preserve human resources. The Act contains a general duty clause that covers those situations not addressed by specific standards. This clause states that each employer shall furnish the place of employment, which is free from organized hazard that are causes of or are likely to cause death or physical harm to employees (Lloyd & Rue, 1992).

The Factories, Offices and Shops Act, 1970 (Act 328)

The Factories, Offices and Shops Act (Act 328) and its related regulations including Boilers and Pressure Vessels Safety Regulations, regulate the occupational safety and health of workers in Ghana. The Department of Factories Inspectorate has the statutory responsibility for the enforcement of the Act and its regulations whose objective is to promote measures to ensure

safe persons at work and safe place of work in factories, offices, shops, building operations and works of engineering constructions and docks. The Act which was promulgated by the government was, for the most part, a restatement of the requirement of the Factories Ordinance of 1952 with innovations made to bring it in line with the internationally accepted standards proving for the safety, health and welfare of persons employed in factories, offices and shops. [As amended by the Factories, Offices and Shops (Amendment) Law, 1991 (Provisional National Defense Council Law (PNDCL 275), s.1 (k)].

General Provisions

The general provisions in the Act include the following:

Notification of industrial poisoning or diseases: Cases of poisoning by lead, phosphorous, arsenic, mercury, or manganese; toxic anemia, toxic jaundice, anthrax and certain other industrial diseases occurring in any factories or shop must be reported immediately to the Chief Inspector or the inspector for the district (Section 12).

Notification of accident and dangerous occurrences: Accident, causing loss of life or disabling a worker for more than three days form earning full wages at the work which he/her was employed, must be reported forthwith to the Chief Inspector or the inspector for the district and the case entered in the General Register. Certain dangerous occurrences must also be reported whether disablement is caused or not for example, the bursting of revolving vessel wheel or grindstone moved by mechanical power, the collapse or failure of a crane, hoist or other lifting appliances, or the overturning of a crane and explosions of fires in certain circumstances (Sections 10 & 11).

Accurate records on accidents in Ghanaian industries are very difficult to obtain as many work related accidents and illnesses are not reported at all. This notwithstanding, the requirement under the labour decree that all accidents that incapacitate workers for more than five day must be notified. Moreover, the method of reporting disabling accidents, though satisfactory for purposes of workmen's compensation requirements was quite inadequate for statistical purposes since statistical information was necessary to give proper guide to the size or nature of the problem as well as indicating directions in which remedial actions are urgently needed. The statement above underscores the fact that statistical information on work-related diseases and accidents are difficult to obtain, as those available are at best only estimates, not the actual figures.

Safe means of Access, and Place of Employment: As far as it is reasonably practical, there must be provision of safe means of access to every place at which any person has at any time to work. Every such place should be kept safe for everyone working there and there should be fencing or other means to ensure the safety of any person who is to work at a place from which he would be liable to fall more than eight feet and which does not provide secure foothold or secure handhold. Sufficient clear and unobstructed space should be maintained at every machine in motion to enable work done without unnecessary risk (Section 34).

Training and Supervision of Inexperienced Worker: No person may work at any machine or in any process likely to cause him injury unless fully instructed as to the dangers likely to arise and the precautions, which he must take and has received sufficient training or is under adequate supervision (Section 36).

New machines: New power-driven machines must not be sold, let out, hired, or used unless certain specified parts are effectively guarded (Sections 41).

Protection of eyes: Suitable goggles or effective screens must be provided in certain specified processes. Where electric arc welding is carried, out the process must be screened or other provision made to prevent persons other than the actual welders from being affected by the electric arc flash (Section 25).

Duties of persons employed: A person employed must not deliberately interfere with or misuse any means, appliance, convenience or other things provided under the Act for securing the health, safety or welfare of employees. No employee must, willfully and without reasonable cause, do anything liable to endanger him or others. Where the law requires any means or appliance to provide for securing health or safety, persons employed must make use of such means and applications (Section 78).

Meals in certain dangerous trades: A person must not partake in food or drink in any room of a factory or shop where any poisonous substances are used as to give rise to dust or fumes. Suitable arrangements should be made to enable persons employed in any such room to take their meals elsewhere in the premises (Section 24).

First aid: A first aid box or cupboard of the prescribed standard, containing requisite first aid drugs and items must be provided in every factory, office and shop. Each box must be placed in charge of a responsible person who might possibly have acquired adequate knowledge in first aid treatment and must always be readily available during working hours (Section 28).

Precautions against fire and explosion: Every factory, office and shop must have adequate and appropriate means of fighting fire, which must be kept in good condition and readily available for use. All stocks of highly inflammable substance must be kept in a fire- resisting store or in a safe place outside the building; the store in such cases must not be so placed as to endanger any exit from the factory if any fire occurs inside the store (Section 31).

Fencing of dangerous machinery. Every dangerous part of any machine should be securely fenced or guarded unless it is in such a position or of such construction as to be as safe or out of reach to every person employed or working in the premises or may be near the machine (Section 38) .

Inspection

It is management's responsibility to implement a regular system of scheduled safety inspections for each workplace process and machine. For certain items of plant, the frequency of inspection and the records to be maintained are laid down in the relevant regulations or are recommended in applicable codes of practice (examples, cranes lifting tackles, steam boilers). It is essential to establish clearly who is to inspect what and at exactly what intervals and who in turn is to supervise these inspection activities. There should be a procedure for checking that corrective action is taken promptly following an adverse inspection report.

Safety representatives are entitled to inspect the workplace or any part of it if they have given the employer or the employer's representative reasonable notice in writing of their intention to do so. By agreement with the employer, inspections can be more frequent. Inspection of the workplace may be jointly carried out by the employer or employer's representatives and safety representatives and it will be often by the employer or employer's officer or specialist advisers to be available to give technical advice on health and safety matters which may arise during the course of inspection.

The safety representations will bring to the employer's notice (normally in writing) any unsafe or unhealthy conditions that come to their attention. In some cases, urgent safety and health matters are brought to the attention of the employer by direct oral approach. In the first instance, particularly where speedy remedial action is necessary or where there has been a

modifiable accident, dangerous occurrence, disease and it is safe and in the interests of the employees, the safety representatives may carry out an inspection where it is reasonably practicable to do so. The employer shall provide such facilities and assistance as may reasonably be required for such an inspection. Where it is necessary for the employer, following an accident or dangerous occurrence to take urgent steps to safeguard against further hazards, the employer should notify the safety representative of the action taken and confirm it in writing (EnTra Publication, 1992).

Factory Inspectors

Factories Inspectors are appointed under the Factories, Offices and Shops Act 1970, (Act 328) and through them the government who takes a very lively interest in industrial accidents and health hazards prevention, exerts every means in its power to keep them as low as possible. They may enter a factory, office or shop at any reasonable time by day or by night if there is good cause to believe that people are at work there. They may require the production of registers, certificates and other papers. They may also exercise such other powers as may be necessary for carrying the Act into effect, including certain powers of taking samples for analysis. It is an offence to obstruct an inspector in the execution of his duties, (Sections 74 to 77). The inspectors expect the employers to provide facilities such as toilets, urinals, washing and sitting facilities as well as change rooms or places for workers' cloths.

The safety provisions seek to ensure that there is enough firefighting equipment to fight any fire outbreak or escape routes for employees. There are also provisions for fire alarms and drills. It is required that all dangerous parts of machinery are securely guarded and equipment is checked periodically. The Chief Inspector has the prerogative to prosecute any employer for failing to comply with the provisions of the Act. [As amended by the Factories, Offices and Shops (Amendment) Law, 1991 (PNDCL 275), s.1 (k)].

Penalties for contraventions of the Act: Most persons who are connected to factories, offices and shops Act whether employers or employees would carry out the provisions mentioned in the Act because they are necessary for the prevention of accidents. The preservation of health and in the fellow men or with desire to have an unfair advantage over their law-abiding competitors, would disregard their obligations and for those persons, penalties consisting of a fine or imprisonment or both have been included in the Act.

Safety Representatives

One of the more important innovations of the Health and Safety at Work Act is the provision for the appointment by recognized independents trade unions of safety representatives from among the employees, who would represent them in conjunction with employers. Their other prescribed functions include investigating hazards, dangerous occurrences, the causes of accidents and complaints by employees: making representation to the employer arising from the investigations made and on general matters affecting health, safety or welfare; consulting with inspectors and receive information from them. They are further to attend meetings of safety committees in connection with his or her functions and to make formal inspections periodically or where there has been a substantial change in the conditions of work (introduction of new machinery) or following justifiable accidents and occurrences of disease.

Safety Committee

The Occupational Safety and Health Act 1994 (OSHA, 1994), which is based on the concept of self-regulation places the responsibility to ensure safety and health of workers on those who create the risk. As such, it is important that both employer and employees undertake the responsibility to provide a safe and healthy workplace. One of the ways is by forming a Safety and Health Committee where both employer and employees can actively get involved and participate in implementing safety and health programme at their workplaces.

Section 30 of OSHA 1994 makes it compulsory for employers who have more than 40 employees to establish safety and health committee at their workplaces or otherwise directed by the Director General of OS&H.

A safety committee is a group of employees appointed to advise management on matters of safety at the work place. The committee may be composed of managers, supervisors, workers and safety specialists. It is important that top managements are represented and participate in the organization and conduct of committee meetings.

There should be a satisfactory balance between management and workers representatives on the committee. The duties of the committee includes the following: recommend (or critique) safety policy issues by top management, develop in-house safety standards and ensure compliance by workers, provide safety training for employees and supervisors, conduct safety inspections, continually promote the theme of job safety through the elimination of unsafe conditions and unsafe behaviours. The Safety Committee also holds regular meetings at which accidents, dangerous occurrences, records and programme plans are discussed (Cascio, 1992).

Working Conditions

The following shall be discussed: Good housekeeping, Machine Layout, Protective Clothing, Fire prevention and maintenance.

Good housekeeping

Krar, Gill, and Smid (2004) opined that operators should remember that good housekeeping would never interfere with safety or efficiency; therefore, the following points should be observed at work places.

Passages and gangways must be clear of obstructions; apart from being a hazard in them, obstructions could prevent a person from escaping quickly in an emergency.

Tools, which are not in use, must be placed in proper places so that they can easily be found when needed. Materials should be stacked carefully and tidily so that they cannot fall or obtrude into the passageway where someone can walk into them.

The floor must be kept clear and clean. Scraps such as off cuts, welding rods and cable ends, should be deposited in waste containers. Oil, grease or liquid spillages are potential hazards and must be made safe and cleaned up immediately.

Oil absorbing and neutralizing compounds should be used immediately a spill occurs; sand or sawdust should not be used as they can cause more problems than they are solved. As in emergencies, people can trip over them and fall.

Protective Clothing

For general workshop purpose, the boiler suit is the most practical and the safest form of body protection. However, to be completely effective, certain precautions must be taken.

Sharp tools: Sharp tools protruding from the breast pocket can cause severe wounds to the wrist. Since the motor nerves of the fingers are near the surface in the wrist, these wounds can paralyze the hand and fingers.

Button missing: Since the overall cannot be fastened properly, it becomes as dangerous as any other loose clothing and is liable to be caught in moving machinery.

Loose cuffs: Not only are loose cuffs liable to be caught up like any other loose clothing, they may also prevent the wearer from snatching his or her hand away from a dangerous situation.

Hole in pocket: Tools placed in the pocket can fall through onto the feet of the wearer. This may not seem potentially dangerous, as stout shoes should protect feet, but it could cause an accident by distracting attention at a crucial moment.

Overall too long: Excessively long overalls can cause falls, particularly when negotiating stairways.

Lightweight shoes: The possible injuries associated with lightweight and unsuitable shoes are:

- Severe puncture wounds caused by treading on sharp objects.
- Crushed toes caused by falling objects.
- Damage to the Achilles tendon due to insufficient protection around the heel and ankle.

In addition to body protection, it is necessary to protect the head, eyes, hands and feet.

Eye protection: Although it is possible to walk on a wooden leg, nobody has ever seen out of a glass eye. Therefore, eye protection is possibly the most important safety precaution to take in the workshop. Eye protection is provided by wearing suitable goggle.

Eye injuries fall into two main categories: pain and inflammation due to abrasive grit and dust getting between the lid and the eye.

Head Protection: includes industrial safety helmets to protect against falling objects or impact with fixed objects; industrial scrap protectors to protect against striking fixed obstacles, scraping or entanglement and caps and hairnets to protect against scraping and entanglement.

Hand protection: An engineer's hands are in constant use and then run the risk of handling dirty, oily, greasy, rough, sharp, brittle, hot and maybe toxic and corrosive materials. Gloves and palms

in a variety of styles and materials are available to protect the hands, whatever the nature of the work.

Gloves are sometimes inappropriate, e.g. for working precision machines, but hands still need to be protected from oil and grime, though not cuts and abrasions, by rubbing them in a barrier cream before starting to work. This is antiseptic, water-soluble cream, which fills the pores of the skin and prevents the ingress of dirt and subsequent infection. The cream is easily removed by washing, which carries away the dirt and removes sources of infection.

Foot Protection: Unsuitable footwear should always be discouraged. It is extremely dangerous to wear lightweight casual or sports shoes in the workplace. They offer no protection from crushing or penetration. In safety footwear, protection that is provided by a steel toecap (inside the boot or shoe) conforms to a strength specification in accordance with British Standards 1870. Safety footwear is available in a wide range of styles.

Fire Prevention

The following precautions should be followed in order to prevent fire in the workshop:

- Always dispose of oil rags in proper metal containers.
- Know the location and the operation of every fire extinguisher in the shop.
- Know the location and the nearest fire exit from the building.
- Know the location and the nearest fire-alarm box and its operation procedure.

Maintenance

Maintenance, cleanliness and periodic overhaul of the equipment in the workshops are the keys to the efficiency of any department. Maintenance engineering is concerned with the day-by-day problem of keeping physical plan in good operating condition.

Maintenance ensures that machines and equipment operate at the required level of productive forms of maintenance. According to Mobley (2004), maintenance could be classified into three main categories namely; corrective, preventive and predictive maintenance. Corrective maintenance involves the repair of machine after an occurrence of a breakdown. In a sense, corrective maintenance becomes repair work. Repairs made after the equipment is out of order.

Preventive maintenance, however, is undertaken when the need arises and is aimed at minimizing the possibility of unanticipated production interruption or major breakdown. Preventive maintenance therefore consists of proper design and installation of equipment, periodic inspection of plant and equipment to prevent breakdowns before they occur, repetitive servicing, upkeep and overhaul of equipment and adequate lubrication, cleaning and painting of equipment.

Predictive maintenance is one of the newer types of maintenance scheme, which is gradually gaining increasing attention. It is a preventive type of maintenance that involves the use of sensitive instruments (e.g. vibration analyzers, amplitude meters, audio gauges, optical tooling, pressure, temperature and resistance gauges) to predict trouble. Conditions are measured periodically or on a continuous basis to enable the maintenance people to establish the imminence of need for overhaul. This allows an extension to the service life without fear of failure. Khanna, 2009; and Mobley (2004) outlined the following objectives of maintenance:

- Greater plant availability.
- Few breakdowns occur in plant if they are maintained regularly and correctly.
- Maintenance is carried out when it is most convenient and will cause the minimum loss of production.
- Regular, simple maintenance results in less down time than in frequent expensive ad-hoc maintenance.

- Excessive length of downtime is reduced. Spaces and equipment demand are known in advance and are available when necessary.
- Regular, simple servicing is cheaper than sudden expensive stopgap repair and
- Regular, planned servicing and adjustment maintains a continuously high level of plant output, quality performance and efficiency.

Demerits of Maintenance

Khanna (2009) itemized that lack of maintenance of plant and equipment in the workshop will lead to the breakdown of these components, which creates problems such as:

- Waste of time and finances
- Loss of production line
- Over use of spare parts
- High rate of accidents
- Failure to recover overheads.

Ventilation

Generally, an adequately ventilated workshop should be sufficient to avoid discomfort or hazard to the workers. The main concern is the control of air pollution by toxic fumes or smoke emitted from processing such as welding austenitic manganese steel and others. When shielded metals processes is done in a closed workshop, the fumes released will eventually reach an appreciable concentration, being distributed throughout the volume as the welding are heated with the air around it, the workers in the shop will breathe in the fumes and they will be exposed to more fumes directly from the welding zone.

For working indoors, good general ventilation is required. If particular toxic hazards are present, exhaust ventilation should be provided, including extractor nozzle, air hose and discharge system. Enough polluted air in the shop must be extracted to reduce fumes to an

acceptable level, which should be substantially lesser than the desired maximum exposure level of2mg/m3 (Balchin & Castner, 1993).

Factories Act 328 part 5 section 17 states that ‘Effective provision shall be made to secure and maintain sufficient and suitable lighting, whether natural or artificial, in every part of any factory, shop and office.

CHAPTER THREE

METHODOLOGY

The researcher was conscious of the fact that the success of the research depends on the methods and procedures used in collecting, gathering and analyzing information and data. To ensure effective data gathering, the following was considered as sub-heading in this chapter.

- Research design
- Population and sample
- Instrumentation
- Data collection technique
- Date analysis.

Research Design

The research methods used for this study were quantitative and descriptive method. With the descriptive method as reported by Creswell (1994), it intends to present facts about the nature and status of a situation as it exists at the time of the study. Again it concerns the relationship and practice that exist, beliefs and processes that are ongoing, effects that are being felt or trends that are developing (Best 1970). The questionnaire was designed to address respondents' perceptions of safety management of motorcycle mechanics in Bolgatanga Municipality.

Population and Sample

Generally, population refers to the number of people living in a particular place or geographical area, but to the researcher, population refers to people from whom information is gathered for this research work. Therefore, the population of this study was mainly artisans (master motorcycle mechanics). Random sample method was used. Fifty (50) artisans were interviewed in the course of the research.

Instrumentation

The instruments used for the collection of data for this study was questionnaire. Questionnaires are easy to administer, friendly to complete and fast to score and therefore take relatively very little time of researchers and respondents. The questionnaires were based on the research questions, literature review and the purpose of the study. The questionnaires were made up of close and open-ended questions.

Data Collection Techniques

Questionnaires and observation were the main data collection techniques for this study. The questionnaires were distributed to the artisans of selected workshops. The aim of the study was explained to the respondents before giving out the questionnaires. The researcher gave the respondents enough time of one week to complete and return the questionnaires. Respondents who could not read were assisted by the researcher.

Data Analysis

Statistical Package for Social Sciences version (SPSS v16) was used to analyze the data that was collected from the respondents in percentages.

CHAPTER FOUR

ANALYSIS OF RESULTS

This chapter analyses the results from the data collected from questionnaires. Different statistical tools like frequency tables; percentages and central tendencies; mean, median, and standard deviation from Statistical Package for Social Sciences (SPSS v16) was used to analyze the results.

The numbers of questionnaires administered to the Motorcycle Mechanics (Artisans) were fifty (50) and the response rate was also fifty.

Characteristics of the Respondents

The researcher looked at the characteristics of the respondents' gender, educational level, age, job position and marital status in the industrial area.

Gender, Educational Level, Age, Job Position and Marital Status Distribution

Table 4. 1 below gives the gender distribution of the respondents. The respondents used for the study were all males (n=50, 100%). Analysis of the level of education of respondents showed that majority of the respondents (n=22, 44%) went up to Junior High School whereas 20 respondents representing 40% went up to the Primary Schools. However, only 5 respondents making up 10% completed Senior High School and 3 respondents (6%) had No Formal Education.

Again in table 4. 1, majority of the respondents (n=22, 44%) were aged 30 – 34 years whereas 18 respondents being 36% of the total respondents were aged 25 – 29 years. Only 4 (8%) respondents were aged 35 – 39 years. All respondents surveyed were all Master motorcycle mechanics (artisans) (n=50, 100%) without any apprentices.

Almost two-thirds of the respondents were married (n=37, 74%) whereas 12 representing 24% were single whiles only 1 respondent making up 2% was a widower at the time of survey.

Table 4.1 Gender, Educational Level, Age, Job Position and Marital Status of Respondents

Variables	Frequency	Percentage (%)
Gender of Respondents		
Male	50	100
Female	0	.0
Level of Education		
Primary School	20	40
Junior High School	22	44
Senior High School	5	10
No Formal Education	3	6
Age		
19 and below	1	2
20 – 24	3	6
25 – 29	18	36
30 – 34	22	44
35 – 39	4	8
40 – 44 yrs	2	4
Position at Job		
Master Craftsman	50	100
Apprentice	0	0
Marital Status		
Married	37	74
Single	12	24
Widow/Widower	1	2

Source: Field Data 2013

Table4. 2 Work Experiences of Artisans

Work Experience	Frequency	Percentage
1 – 5 yrs	27	54
6 – 10 yrs	16	32
11 – 15 yrs	5	10
16 – 20 yrs	1	2
21 – 25 yrs	1	2

Source: Field Data 2013

Further analysis showed that more than half of the respondents surveyed (n=27, 54%) had about 5 years of working experience whereas 16 respondents consisting 32% of the total population of respondents had from 6 to 10 years of working experience. Also, only 5 respondents representing 10% had 11 – 15 years of working experience as showed in table 4. 2.

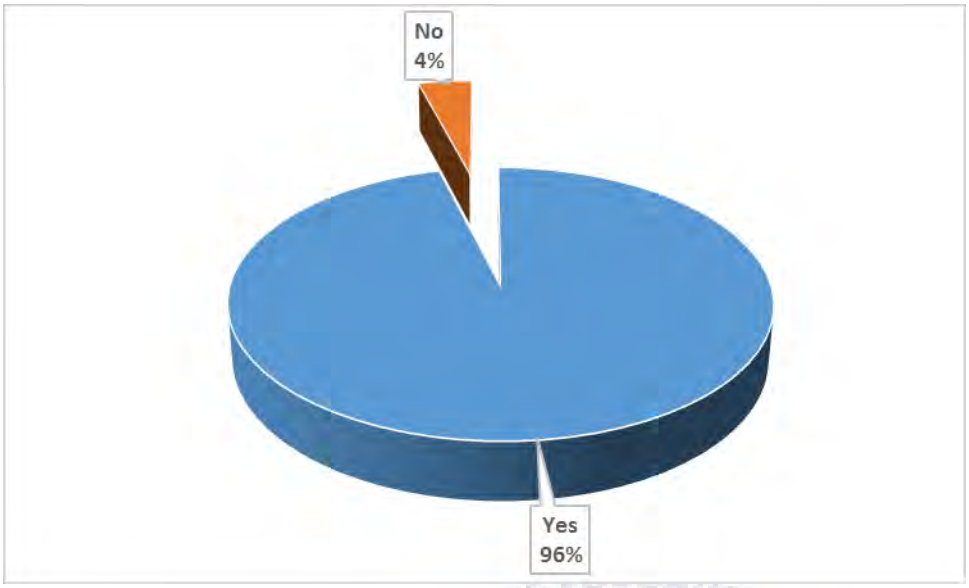
Table4. 3 Number of Years Artisans Served as Apprentices

	Frequency	Percent
2 yrs	2	4.0
3 yrs	34	68.0
4 yrs	8	16.0
5 yrs	4	8.0
6 yrs	2	4.0
Total	50	100.0

Source: Field Data 2013

In table 4. 3 respondents were asked to indicate how long they served as apprentices. The results show that more than half (n=34, 68%) served for 3 years whereas 8 respondents representing 16% served 4 years as apprentices. Also, 4 respondents (8%) served for 5 years and only 2 (4%) respondents served for 6 years.

Figure 4. 1 Completion of Apprenticeship



Source: Field Data 2013

Figure 4. 1 shows a graphical display of the results regarding respondents who fully completed their apprenticeships. The diagram shows that 96% of the respondents fully completed their apprenticeship whereas only 4% were not able to complete fully.

Table 4.4 Certification of Artisans

	Frequency	Percent
Yes	48	96.0
No	2	4.0
Total	50	100.0

Source: Field Data 2013

Respondents were asked to indicate whether they were certified by their masters upon the completion of their apprenticeship. Table 4. 4 above shows that majority of the respondents (n=48, 96%) were certified by their masters at the end of their apprenticeship. However, 2 respondents (4%) were not certified by their masters because they did not complete their apprenticeship.

Table 4. 5 Training Courses or Seminars for Artisans on Industrial Safety

	Frequency	Percent
No	50	100.0

Source: Field Data 2013

Questions on this section looked at the opportunities the artisans had to attend training courses or workshops on industrial safety and the benefits that the artisans had had from such courses. None of the respondents has ever attended a training course or seminar on industrial safety before. Showing in table 4. 5 respondents (n=50, 100%) were asked to indicate this and all responded 'No'.

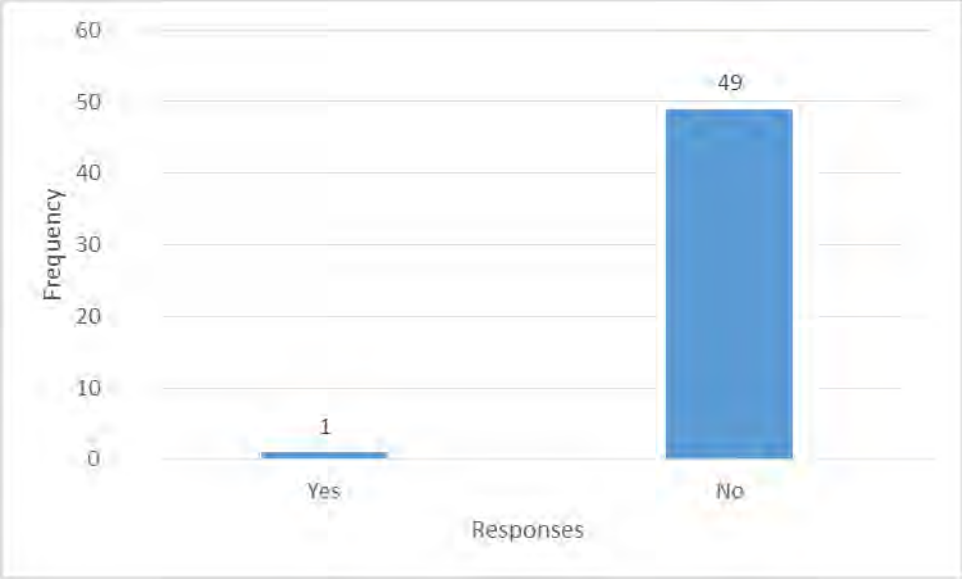
Table 4. 6 Display of Warning Sign

	Frequency	Percent
No	50	100.0

Source: Field Data 2013

In table 4. 6 respondents were asked to indicate whether they display warning signs in potential danger areas in their workshops and the results shows that none of the respondents display warning signs thus all responded 'no' to the assertion.

Figure4. 2 First Aid Box in Workshops



Source: Field Data 2013

Showing in figure 4. 2 above gives the responses of respondents regarding first aid box in their shops. The results show that 49 respondents responded ‘no’ to having first aid boxes in their respective workshops whereas only 1 respondent responded ‘yes’ to having the box in the workshop.

Table 4. 7 Ventilation in the Workshop

	Frequency	Percent
Yes	50	100.0

Source: Field Data 2013

In table 4. 7 all the respondents (n=50, 100%) responded 'Yes' to having their workshops well ventilated as repair work is done in the open. Thus none responded 'no' to the statement.

Table 4. 8 Firefighting Equipments in the Workshop

	Frequency	Percent
No	50	100.0

Source: Field Data 2013

Results in table 4. 8 show that none of the respondents surveyed had firefighting equipment in their workshop to fight fire in case there is an outbreak.

Table 4. 9 Use of Instructional Manual of New Motorcycle

	Frequency	Percent
No	50	100.0

Source: Field Data 2013

In table 4. 9 respondents were asked to indicate whether they read the instructional manual on the use of new motor bikes before working on them and all the respondents (n=50, 100%) responded 'No' to reading the instructional manual to use a new bike.

Table 4. 10 Use of Protective Clothing χ=21.674a, p=0.001

	Level of Education				
	Primary	JHS	SHS	No formal Education	Total
Yes	2	6	5	3	16
	12.5%	37.5%	31.2%	18.8%	32.0%
No	18	16	0	0	34
	52.9%	47.1%	.0%	.0%	68.0%
Total	20	22	5	3	50
	40.0%	44.0%	10.0%	6.0%	100.0%

Source: Field Data 2013

Table 4. 10 above shows across-tabulated results of respondents wearing protective clothing when working. The output shows that more than half of the respondents (n=34, 68%) responded 'No' to wearing protective clothing when working. However, 16 (32%) respondents responded 'Yes' to wearing protective clothing when working. A statistically significant association was found between the responses of respondents (Chi-square = 21.674a, p=0.001).

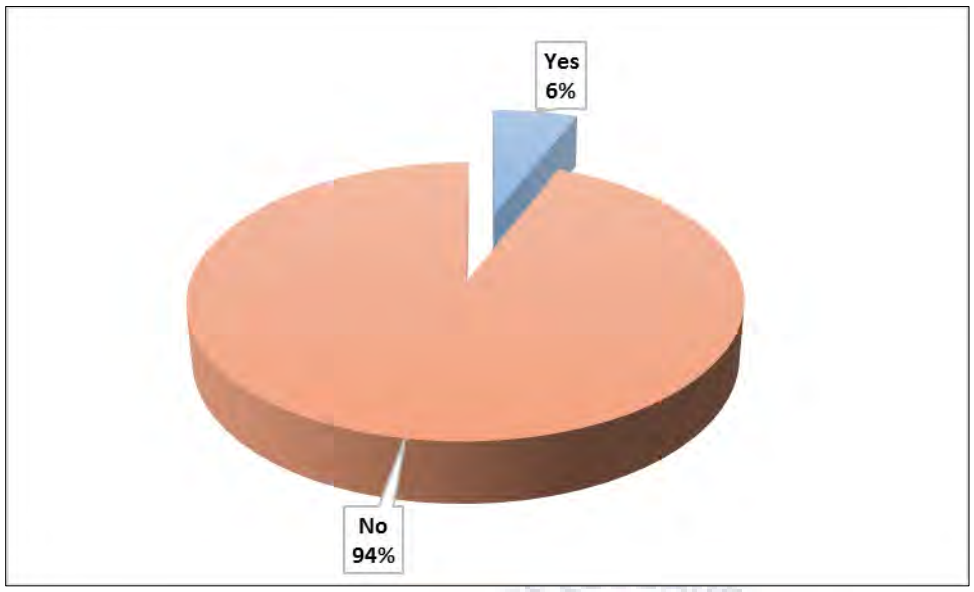
Table 4. 11 Use of Glove When Filling

	Frequency	Percent
No	49	98.0
Sometimes	1	2.0
Total	50	100.0

Source: Field Data 2013

Table 4. 11 above gives the results of respondents using gloves when filing. The output indicates that almost all the respondents (n=49, 98%) do not put on gloves when filing whereas only 1 respondent (2%) reported of 'sometimes' using gloves when filing.

Figure 4. 3 Use of Prescribed Safety Boot in the Workshop



Source: Field Data 2013

Respondents were asked to indicate whether artisans in the area wear prescribed safety boots. The results presented in figure 4. 5 above shows that majority of the respondents 94% stated 'No' implying that artisans do not wear prescribed safety boots whereas only 6% of the respondents reported 'Yes' meaning they find the artisans wearing prescribed safety boots.

Figure4.5 If No specify

	Frequency	Percent
Sandals	7	14.0
Bathroom slippers	19	38.0
Canvas boots	12	24.0
Old tattered shoes	10	20.0
Total	48	96.0

Source: Field Data 2013

Respondents who responded 'Yes' to not wearing prescribed safety boots were asked to give what they usually wear to the workshop. The responses as presented in figure 4. 5 showed 19 respondents (38%) reported the artisans use 'Bathroom Slipper' whereas 12 respondents being 24% stated Canvas Boots. Also, 10 respondents consisting 20% reported 'Old tattered shoes' while 7 respondents representing 14% stated 'Sandals'

Table 4. 12 Use of Well-fitting overall by Artisans

	Frequency	Percent
Yes	3	6.0
No	47	94.0
Total	50	100.0

Source: Field Data 2013

Table 4.1 2 give the results on whether the artisans wear overall at the workshop. From the results it could be seen that more than two-thirds of the respondents (n=47, 94%) responded 'No' whereas 3 respondents representing 6% on the other hand responded 'Yes' to the statement that artisans wear well-fitting overall.

Table4. 13 Use of Gloves When Handling Sharp Components

	Frequency	Percent
No	50	100.0

Source: Field Data 2013

In table 4. 13 it could be seen that all the respondents (n=50, 100%) responded 'no' to putting on gloves when handling component with sharp edges.

Table 4.14 Oil Spillage in the Workshop

	Frequency	Percent
Yes	50	100.0

Source: Field Data 2013

Respondents were asked to indicate whether they clean or cover oil or grease when they spill onto the floor. The output shows that all the respondents (n=50, 100%) responded 'Yes' to cleaning or covering oil or grease when they spill onto the floor as showed in Table 4.14 above.

Table 4.15 Workshop Cleanliness * Level of Education χ=45.571, p=0.001

	Level of Education				
	Primary	JHS	SHS	No formal Education	Total
Yes	17	0	0	0	17
	100.0%	.0%	.0%	.0%	34.0%
No	3	2	0	0	5
	60.0%	40.0%	.0%	.0%	10.0%
Sometimes	0	20	5	3	28
	.0%	71.4%	17.9%	10.7%	56.0%
Total	20	22	5	3	50
	40.0%	44.0%	10.0%	6.0%	100.0%

Source: Field Data 2013

In table 4.15, respondents were asked to indicate whether they clean their shops after the day's work. The output shows that more than half of the respondents (n=28, 56%) reported they 'sometimes' clean their shops after the day's work. Also, 17 respondents representing 34% responded 'Yes' to cleaning their shops whereas 5 respondents (10%) on the other hand responded 'No' to cleaning their shops after the day's work. Further analysis of the result

provided enough evidence to suggest a statistically significant association between the responses of respondents and their level of education (Chi-square=45.571, p=.001)

Table 4.16 Washing Hands with Clean Water before Eating

	Frequency	Percent
No	48	96.0
Sometimes	2	4.0
Total	50	100.0

Source: Field Data 2013

In table 4.16 respondents were asked to report whether they wash their hands with clean water and soap before eating. The responses shows that almost all the respondents (n=48, 96%) do not wash their hands before eating. However, only 2 respondents reported of 'sometimes' washing their hands with clean water and soap before eating.

Table 4.17 Accidents in the workshop * Level of Education χ=59.103, p=0.001

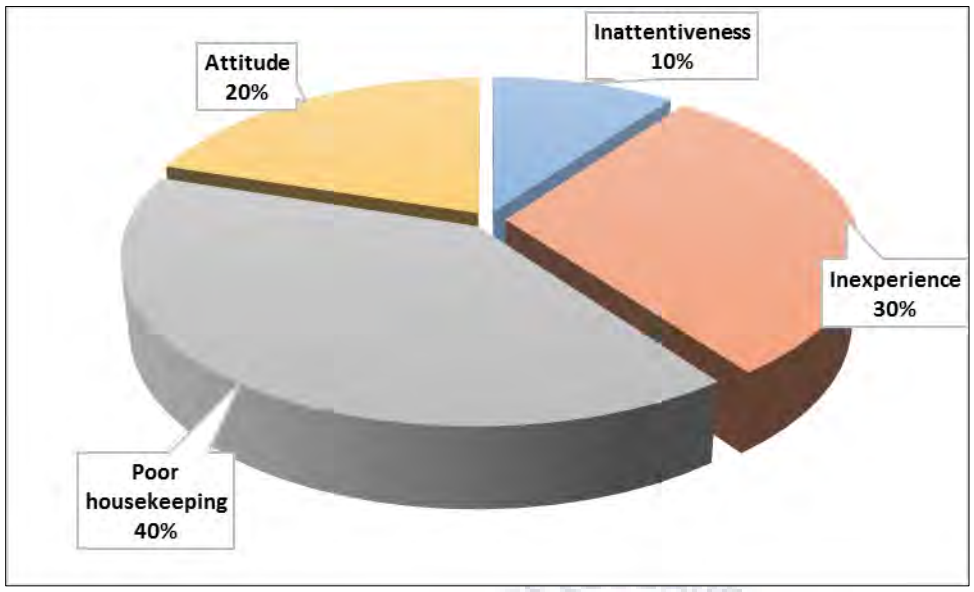
	Level of Education				
	Primary	JHS	SHS	No formal Education	Total
Yes	20	9	0	0	29
	69.0%	31.0%	.0%	.0%	58.0%
No	0	0	3	3	6
	.0%	.0%	50.0%	50.0%	12.0%
Sometimes	0	13	2	0	15
	.0%	86.7%	13.3%	.0%	30.0%
Total	20	22	5	3	50
	40.0%	44.0%	10.0%	6.0%	100.0%

Source: Field Data 2013

Table 4.17 presents cross-tabulated results on respondents' responses on whether accidents do occur in their workshops. The output shows that more than half of the respondents (n=29, 58%) reported that accidents occur in their workshops. Also, 15 (30%) of the respondents reported that it 'sometimes' occur in their workshops. However, 6 respondents (12%) reported that accidents do not occur in their workshops. A further breakdown of the results according to the level of

education of respondents revealed a statistically significant association between the two variables thus (Chi-square=59.103, p=.001).

Figure 4.4 Causes of Common Accidents in the Workshop



Source: Field Data 2013

In figure 4. 4 respondents were asked to give what in their opinion they consider the causes of accidents in their workshops. From the figure 40% of the respondents attributed the causes of accidents to Poor Housekeeping whereas 30% reported of Inexperience among workers. Also, 20% of the respondents pointed to the Attitude of workers whiles 10% said Inattentiveness or workers to safety issues.

Table 4.18 Effects of Accidents/Injuries in the Workshop

	Frequency	Percent
Loss of man hour	5	10.0
Illness	12	24.0
Absenteeism	16	32.0
Cost of Treatment	17	34.0
Total	50	100.0

Source: Field Data 2013

Respondents were asked to give some of the effects of accidents in their workshops. The results as presented in table 4.18 shows that 17 respondents representing 34% reported of the cost of treatment as one effect of accidents whereas 16 respondents consisting (32%) also pointed to Absenteeism. Also, 12 respondents representing 24% said Illness whiles 5 (10%) reported of Loss of man hours at the workshop.

Table 4.19 Cost of Major Repairs of Motorcycle

	Frequency	Percent
GH ¢30	11	22.0
GH¢ 20	30	60.0
GH¢ 15	9	18.0
Total	50	100.0

Source: Field Data 2013

Respondents were asked to give the cost of major repair (engine down) work on a motorcycle and the results showing in table 4.19 indicates that majority of the respondents (n=30, 60%) stated GH¢ 20 as the cost of major repairs. Meanwhile, 11 respondents being 22% reported of GH¢ 30. In addition 9 respondents (18%) will cost the repairs at GH¢ 15.

Table 4.20 Cost of Minor Repairs of Motorcycle

	Frequency	Percent
GH¢ 3.00	12	24.0
GH¢ 2.00	33	66.0
GH¢ 1.00	5	10.0
Total	50	100.0

Source: Field Data 2013

On the issue of minor repairs (changing of oil) as presented in table 4.20 more than half of the respondents (n=33, 66%) stated it would cost GH¢ 2 whereas 12 respondents (24%) stated the cost as GH¢ 3. The remaining 5 respondents (10%) would cost minor repairs at GH¢ 1.

Table 4.21 Cost of Assembling a New Motorcycle

	Frequency	Percent
GH¢ 40	5	10.0
GH¢ 30	20	40.0
GH¢ 20	25	50.0
Total	50	100.0

Source: Field Data 2013

For the cost of assembling a new motor cycle, results showing in table 4.21 suggests that half (n=25, 50%) of the respondents would cost new assemble of a motorbike at GH¢ 20 whiles 20 respondents (40%) will charge GH¢ 30. Only 5 respondents (10%) will charge GH¢ 40.

Table 4.22 Association of Motorcycle Mechanics

	Frequency	Percent
No	50	100.0

Source: Field Data 2013

Table 4.22 above gives information on whether there is a motorcycle association in the Bolgatanga metropolis. The response from all the respondents (n=50, 100%) was 'No' implying there is none in the area.

CHAPTER FIVE

DISCUSSION

This chapter discusses the results in chapter four and their implications.

Bio-Data

The respondents for the study were all males. Analysis of the level of education of respondents showed that majority (44%) of the respondents went up to Junior High School whereas 40% went up to the Primary Schools. However, 10% completed Senior High School and few (6%) had No Formal Education.

Forty-four percent of the respondents were aged 30 – 34 years whereas 18 respondents being 36% of the total respondents were aged 25 – 29 years. Only 4 (8%) respondents were aged 35 – 39 years. All respondents surveyed were all Master Motorcycle Mechanics.

Almost two-thirds (74%) of the respondents were married whereas 12 representing 24% were single whiles only 1 respondent making up 2% was a widower at the time of survey.

Work Experience

The findings showed that 54% of the respondents had about 5 years of working experience whiles 32% had from 6 to 10 years of working experience. Few had 11-15 years of working experience.

Again, a significant number 68% of the respondents served for 3 years as apprentices whereas 16% served 4 years as apprentices. Eight percent served for 5 years and 4% served for 6 years.

On the issue of completion and certification of artisans by their masters, 96% of the respondents fully completed their apprenticeship and were certificated. Only 4% were not able to fully complete their apprenticeship and certificated by their masters.

. **Education**

The importance of education cannot be over-emphasized as it is needed in every sphere of human endeavour. Workers in manufacturing sectors therefore should, at least, have some knowledge of the tools and equipment of their trade and the materials and processes they use. They should be able to, at least read the manual instructions of the machines and equipment that they use. This knowledge is gained through formal education like Junior High School, Senior High School, Technical and Vocational School, Colleges and others.

From the analysis, the educational levels of the majority of the artisans were Primary School and Junior High School graduates (average of 40% from Primary school and 44% from Junior Secondary school). The rest, 10 % were from the Senior High school and 6% have no formal education.

However, most of the artisans have had basic education, but there is still the need for further education or development to improve their knowledge, as safety issues are not safe acts, safe working and environment conditions but also embrace the safe use of the products manufactured. Knowledge of the hazards associated with the job is very essential to the worker and needs instructions in safety issues or undergo safety training especially in his/her area. Most successful safety programmes have the objective to educate employees to be alert to hazardous conditions (Komacek et al., 1997).

Training

Training courses or workshops are means of acquiring different types of information and knowledge about the work you are doing. Among the artisans, 100% said they had never attended any training courses on industrial safety before. It enhanced their skills and knowledge in safety procedures, materials handling and they were using these to acquire knowledge to instruct their apprentices in their own little way to observe safety precautions. Apprenticeship training programmes must not be limited to skill acquisition alone but must seriously include safety management in their curriculum. Safety workshops and seminars could help enhance the knowledge of the artisans about industrial safety.

Safety Law Enforcement

All countries have laws concerning safe working conditions in factories. Every organization or group of people requires a set of rules for proper regulation, safety and protection of the individuals who make up the group. The rules or laws should keep pace with changing conditions.

These laws and regulations cause companies or establishments to use safer methods at work to avoid disaster and prevent workers from accidents or expose them to health hazards. Health and safety laws relating to firms are to be enforced by inspectors from Department of Factories Inspectorate (DFI) (Factory, Offices and Shops Act, 1970, Act 328). Safety representatives are appointed by a recognized trade union mandated to assist in the enforcement of safety law. They must be allowed to investigate accidents, potential hazards and carry out inspection of the workplace (En Tar, 1992).

Visit and Inspection

From the findings, all the artisans said that factories inspectors from the Department of Factory Inspectorate (DFI) never visited or inspected their shops. However, a few of them indicated that their shops have been visited by other institutions such as Asungtaaba Women's Association a local base NGO in Bolgatanga for the purposes of giving them children to train as mechanics. Another institution that visited the artisans is the Bolgatanga Municipal Assembly for the collection of taxes.

The researcher observed that, there is no branch of the Department of Factory Inspectorate (DFI) in Bolgatanga and hence the inability of the artisans to notify them of their existence. Owing to this, it would be very important for a branch of the Department of Factory Inspectorate (DFI) to be established in Bolgatanga to help check safety issues and their enforcement.

Accidents Reporting and Investigation

The artisans' never reported accident cases to any institution so they would be in position to investigate in case of accidents. This perhaps may be due to non existence of Department of Factory Inspectorate in Bolgatanga. As the researcher observed, it is very difficult to obtain an accurate record of the frequency of accidents in Bolgatanga industrial area as most work related accidents and illnesses that occurred are not reported.

Working Condition and perceptions

One of the two main causes of industrial accidents and health hazards is unsafe working conditions, which include physical and environmental conditions. Conducive working conditions contribute positively to the success of firms or enterprises. Artisans therefore have responsibilities to make their shops safe to work in.

Warning Notices

The display of warning notices or signs at potentially dangerous areas and on machines is very important. The warning signs create awareness of dangers ahead and thus, prevent people from exposing themselves to them.

The researcher observed during the study that, all artisans do not display warning notices especially at areas or places deemed potentially dangerous or on faulty machines.

These make the place very dangerous and unfriendly to new worker. This means there is the need for safety education to be organized for artisans by the appropriate authorities.

First Aid

The Factories, Offices and Shop Act (Act 328) part 5 section 28, the section 28 stipulates, "a first aid box or cupboard of the prescribed standard should be provided and maintained in every factory, office and shop. The box should contain nothing except appliances or requisites for first aid, and be placed under the charge of a responsible person who preferably has basic knowledge in first aid".

The majority of artisans in the industrial area flouted this regulation, as 98% of the respondents had no first aid box in their shops. When there was injury, they had to resort to other means of treatment. This means that they applied either brake fluid or grease on minor cuts whenever they sustained injuries. The artisans applied these chemicals on their wounds without knowing their constituents and the insidious effects or future effects on their health.

Ventilation in the Workshop

Generally, an adequately ventilated workshop should be sufficient to avoid discomfort or hazard to the workers. The main concern is the control of air pollution by toxic fumes or smoke emitted from the work environment. Factories Act 328 part 5 section 17 states that 'Effective

provision shall be made to secure and maintain sufficient and suitable lighting, whether natural or artificial, in every part of any factory, office or shop in which persons are working or passing.

The researcher observed that the artisans had no problem with ventilation as they work is done in the open where they had more than enough air blowing.

Firefighting equipments

Every factory, office or shop is required by law to have firefighting equipment in their premises Factory Act (Factory, Offices and Shops Act, 1970, Act 328). This law had been flouted by the artisans as none of the respondents surveyed had firefighting equipment in their workshop to fight fire in case there is an outbreak.

Instruction Manual

Instruction manual is a document that provides motorcycle mechanics with the basic understanding of motorcycle operation, maintenance and safety.

From the study, it showed that all the artisans (100%) do not read instructions on the use of a new motorbike before repairs, which could lead to accident. The findings in this study corroborate Frantz and Rhoades (1993, as cited in Zimolong & Elke, 2006) found that 40% of clerical personnel filling a filing cabinet noticed a warning label placed on the top drawer of the cabinet, 33% read part of it and no one read the entire label

Protective Clothing

The analysis revealed that majority (94%) of the respondents do not put on overall when they were working. The researcher agrees to this because during the data collection he observed all the artisans were not wearing overall whiles working. From the responses, the artisans knew

that it was a requirement to wear overall when working but they were not doing so because they are not use to it.

On wearing of safety boots, 94% of the total respondents answered that they do not wear safety boots. Only few out of this number wore the prescribed safety boots. Majority wore bathroom slippers, cross sandals and canvas boot, whiles all respondents never put on gloves when handling sharp components or filling. When asked why majority of them do not wear these protective clothing even though they are aware of their importance, they responded that, they do not feel comfortable using them. This implies that safety management is a problem.

Housekeeping

Housekeeping involves keeping the work area as tidy as possible. Good housekeeping according to Krar and Gill (2004); Timings and Wilkinson (2000) entail keeping the work area tidy and clear of obstructions, as well as not unsightly. Responses obtained from the artisans indicated that majority had the sense of duty towards good housekeeping practices, and were committed to them as almost all the respondents covered oil or grease with sand when they spilled onto the floor.

The study also showed that, a significant number of the respondents (96%) do not thoroughly washes their hands with soap before eating. This may pose a serious health problem to the artisans as some of the oils may contain chemical which may be harmful to their health. This implies safety management is a problem in the industrial area.

Perceptions about Accidents, Causes and Effects

Man's perception about an event propels him to take certain actions, or influences his attitudes towards an event or situation. Flora (1989, as cited in Wortman et al., 1992) described

attitudes as the thoughts (the understanding, knowledge) and feelings that encourage people to either do certain things, to like or dislike something.

Many artisans perceived accidents only as those fatal ones such as road traffic/motor accidents where people sustained serious injuries or when very heavy component fall on someone's leg. They never considered slipping, minor cuts, burns, shocks, stumbling and others as accidents. These minor or trivial cuts could harbour tetanus and cause death to artisans.

Frequency of Accidents

The idea of some of the artisans about accidents reflected their responses to the question about the common accidents, which occurred in their workshops. Fifty-eight percent of the respondents mentioned poor housekeeping, inexperience among workers, attitude of workers, inattentiveness, burns, falling objects, and hammering of hands. All This attests to the fact that accidents occurred in the shops.

About 42% stated that accidents do not occur in their shops. These may be those who considered accidents only as fatal ones and not the minor cuts, slipping and falling not knowing that these incidents were classified under certain degree of accident.

Naturally, their attitude toward these minor or trivial cuts, slipping, etc. would be relaxed, likewise their commitment to the observation of safety precautions to prevent such incidents from occurring.

Causes of Accidents

The research revealed that generally, the major causes of accidents were unsafe conditions and unsafe acts, which totally agreed to Zimolong and Elke (2006).

Among the respondents, poor housekeeping was one of the highest mentioned causes of accidents. This might be due to the perceptions of the artisans about accidents and their attitudes

towards them. This support the assertion made by Wagner and Kicklighter (1991) that workers have to develop good attitudes towards safety and have strong feeling towards the importance of safety, and therefore be willing to spend time and attention to learning the safety rules and regulations. Ultimately, a safe or good attitude would protect the worker and others, as they would be very cautious not to make mistakes to cause an accident.

Other causes mentioned by the respondents included inexperience, which 30% of them opined. This sign might possibly be among the young and the new apprentices. It confirmed what Cascio (1992) said regardless of length of service, the younger the employee, the higher the accident rate and the fact accidents rates are substantially higher during the first months of employment than in all subsequent time periods.

Generally, most of the causes of accidents as expressed by artisans were identified as unsafe acts. This supports the idea of Lloyd and Rue (1992) who asserted certain acts of people put them or others at risk or cause accidents. It was estimate that unsafe personal acts cause as much as eighty percent (80%) of organizational accidents.

Effects of Accidents

Some of the findings about the effects of accidents complement one another and discussed together. The artisans revealed that if accident occurred, some of the other workers could become demoralized and some would be gripped with fear. This could affect their performance and total output. The moment an accident happened; work would naturally stop, because other workers would attempt to find the cause of the accident. If the victim was seriously injured, the person would be sent to the hospital by the co-workers. Work would not be in progress during this time, thus, resulting in loss of man-hours, high cost of treatment and absenteeism. This when computed into monetary terms depending on the hours of the idle time could affect productivity.

Cost of Repairs of a Motorcycle

The analysis revealed that 60 % of the respondents stated GH¢20.00 as the cost of major repairs (engine down) of a motorcycle. A few of the respondents 22% charge GH¢30.00 while the remaining 18% cost major repairs as GH¢15.00.

On the issue of minor repairs (changing of oil), sixty-six percent of the respondents charge GH¢2.00 and the rest charge between GH¢ 3 and GH¢1.

Again on the cost of assembling a new motorcycle, fifty percent cost new assembling as GH¢20 whiles 40% cost it as GH¢30. Only few charged GH¢40 for new assembling. This implies there is no uniformity in the way the artisans charge for various services rented.

The researcher also observed during the study that, the artisans had no association to regulate their activities, hence the discrepancies in the cost of major, minor and assembling a new motorcycle.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

This chapter of the study summarizes the findings, conclusions and recommendations that would help address some of the problems of safety management in motorcycle workshops in Bolgatanga Municipality and suggestions for future research.

Summary of Findings

The findings in this study demonstrated that, the educational level of majority of the artisans were primary, junior high and senior high school graduates, which made up of the following percentages 40%, 44% and 10% respectively. All the artisans were male and none of them had the opportunity to attend any training, seminar or workshop on industrial safety. Seventy-four percent of the respondents were married with the age range of between 20-35 years being majority (80%).

From the findings, a significant number of the respondents 54% had five years working experience as artisans with 68% serving as apprentices before becoming masters. In addition, 98% of the artisans fully completed their apprenticeship training and were certificated by their masters.

The study also revealed that all the respondents do not display warning sign in their shops or on faulty machines so as to prevent others from using them. Again, none of the respondents had first aid boxes filled with medicine or firefighting equipments to fight fire in case of an outbreak.

In addition, all the respondents do not read instructions on machines before repairs. This makes them exposed to many industrial accidents.

It was observed that poor housekeeping, inexperience among workers, attitude of workers, inattentiveness, burns, falling objects, and hammering of hand were some of the causes of accidents. Majority indicated that accidents and injuries had adverse effect on their shops through reduce productivity.

Furthermore, all artisans had not notified Department of Factory Inspectorate of the existence of their businesses nor report accidents to any institution. In handling component with sharp edge, all the respondents do not put on gloves when handling sharp components. With regard to wearing of safety boots, 94% of the respondents do not wear safety boots. All Artisans also work without well-fitting overalls.

It was also observed that, 96% of the respondents do not thoroughly wash their hands with soap before eating. This may pose health risk to the artisans. The artisans had no problem with ventilation as they work is done in the open.

Again, the study revealed that 60 % of the respondents charged GH¢20 as the cost of major repairs, 66% charged GH¢2 as minor repairs whiles 50% charged GH¢20 for assembling a new motorcycle. The artisans had no association to regulate their activities.

Conclusions

The study has revealed that the educational level of majority of the artisans in this sector was certainly very low. In view this, most of them do not deem it fit to read instructions on the use of new motorcycle before repairs. This may result to accidents. The artisans do not have opportunity to attend any further training or workshop on industrial safety

Artisans in Bolgatanga Municipality lack basic safety management skills in their workshops as this is manifested in their responses to firefighting equipments, usage of appropriate safety attire and proper housekeeping.

Again, there is no Department of Factory Inspectorate in Bolgatanga and hence artisans have not reported the existence of their businesses and accident cases. Accidents and injuries of artisans have effect on productivity.

The study also showed that, the artisans do not have an Association in Bolgatanga to help regulate their activities to ensure uniformity.

On the whole, Occupational Safety management practices are not seen as important to the artisans in Bolgatanga Municipality.

Recommendations

The following recommendations made were in the light of the findings and conclusions drawn from the study and when successfully implemented would improve safety management in Bolgatanga Municipality.

- A branch of the Department of Factories Inspectorate (DFI) should be opened in Bolgatanga to help check the activities of artisans.
- The Department of Factories Inspectorate (DFI) should organize intensive and effective education and training programmes for artisans on occupational safety management.
- The DFI could arrange with the Ghana Road Safety Commission to plan regular training session for artisans in the Industrial Area.
- The Bolgatanga Municipal Assembly could partner with the DFI to periodically organize sensitization seminars on occupational safety management for the artisans.

- Institutions such as the Rural Technology Facility (RTF), TREAD Ghana and Asungtaaba Women's Association locally base NGOs could collaborate to organize training, seminars or workshops on industrial safety for the artisans in the Municipality.

Suggestions for Future Research

- Conduct research to determine how current motorcycle designs affect crash and injury causation.
- Conduct research regarding protective apparel effectiveness.
- Conduct research to examine the perceptions of risk associated with the use of motorcycles.

REFERENCES

1. Amended factories office shops amendment law, 1991 PNDCL 275 s 1 k Retrieved from http://ghanalegal.com/?id=3&law=82&t=ghana-laws.

A Short Guide to Factories, Offices and Shops Act, 1970. Ghana: Publishing Corporation Printing division Accra-Tema.

2. Annoh K. (2001), *Education Studies*, Ghana: J.P Freeman Printing Press- Kumasi
3. Akufaar,F.(2009) *Prevention of Motorcycle Injuries in Africa*. Retrieved on May 3, 2011 from http://www.rtim.net/PDFs/4FrancisAkufaar
4. Alexis, M. H. & Charles, N. J. (1998). *Health and Safety Executive.* London: HMSO
5. Amweelo, M. (2000). Accidents Prevention in Namibia *African Newsletter on Occupational Health and Safety* 2000: 104-8.
6. Anne-Catharine, H.D.S. (1990). *The First-line supervisor's role in safety promotion*. Retrieved on January 4, 2011, from http://www.nsms.us/pages/rolesupervisor.html
7. Aquinas, P.G. (2007). *Human resource management: Principles and Practice* .Vikas Publishing House PVT Ltd
8. Asamoa-Gyimah, K. & Duodu, F. (2007). *Introduction to research methods in Education,*Winneba: The Institute for Educational Development and Extension University of Education.
9. Balchin, N.C.& Castner, H. R. (1993). *Health and safety in welding and allied processes.* New York: McGraw-Hill.

10. Bambang, S. (2010). The role of worker unions in occupational health and safety at industry level. *Asian-Pacific Newsletteron Occupational Health and Safety, 17 (1)*:14–15.

11. Cascio, W.F. (1992). *Management human resources*. New York: McGraw-Hill Book Company.

12. Chapman, W.A.J. (1979). *Workshop technology* (4th ed.). London: Edward Arnold Publishers.

13. David, H. L. (2004) "Motorcycle Riding Skills". March, 5th, 2011. http://www.epochapproach.com/cycle.pdf

14. Gbadamosi, K. T. (2006) "The Emergence of Motorcycle in Urban Transportation in Nigeria and its Implication on Traffic Safety" Association for European Transport and Contributors

15. Gibson, S.& Amoako-Awuku, B.K. (1994*). Practical welding*. London and Basingstoke: The Macmillan Press.

16. Graham, H.T. & Bennett, R. (1992). *Human resources management (*7th ed.). United Kingdom.UK. Longman Group Ltd.

17. Health Safety Executive (1992). *Health and Safety at work: A Guide for Trainers.* London: EnTra Publications.

18. Hudson, W.K. (1992). *May ward's industrial engineering handbook*. New York: McGraw-Hill.

19. Khanna, O. P. (2009). *Industrial engineering and management*. New Delhi: Dhanpat Rai

20. Kiwekete, H.M. (2009). A role of safety culture in preventing accidents in the workplace Occupational Health and Safety in East Africa*African Newsletter on Occupational Health and Safety*, *19 (1):*13–14.

21. Komacek, S. A, Lawson, A. E.& Horton, A. C. (1997). *Manufacturing technology.* New York: Glencoe McGraw-Hill.

22. Krar, S. F, Gill, A.R.& Smid, P. (2005). *Technology of machine tools* (6th ed.)**.**New York: McGraw-Hill Higher Education**.**

23. Lloyd, L.& Rue, L.W. (1992). *Human resources management* (3rd ed.). Boston: Homewood IL 60430 M.A 021161.Richard D. Irwin Inc.

24. Makela, J. (2008). Safe start campaign aims at improving the safety of young workers *African Newsletter on Occupational Health and Safety*, *18 (1):*19–22.

25. Maryam, O. (2009).Safety culture evaluation in the metal products industry of Iran *European Journal of Social Sciences, 11 (1):*161-167.

26. McCormick, E. J.& Tiffin, J. (1971). *Industrial psychology.* London: George Allen and Unwin.

27. Mobley, R. K. **(**2004). *Maintenance fundamentals.* (2nded.)**.** USA: Elsevier.

28. Mukala, K. (2009).Training as a part of the Regional Programme on OccupationalHealth and Safety in East Africa*African Newsletter on Occupational Health and Safety*, *19 (2):*49–50

29. Murray, C. J. L. and Lopez, A. D. (1996). *The Global Burden of Disease*: A Comprehensive Assessment of Mortality and Disability from Diseases, Injuries and Risk Factors in 1990 and Projected to 2020. Vol 1. Cambridge, MA: Harvard School of Public Health on Behalf of the World Health Organization and the World Bank, 247-93. Google Scholar.

30. Pavan, B.& Muchiri, F. (2010). Risk assessment training. *African Newsletters on Occupational Health and Safety*, *20 (2):* 28– 29.

31. Ridley, J.& Channing. J. (2004). *Risk management.* Oxford: Butterworth-Heinemann Linacre House, Jordan Hill ox 280.

32. Killeen, J., Hollyer, W.& Macminn, S. (1999). Suite 102 *Safety sign and warning sign*. Retrieved on September 4, 2011 from http://www.globalspec.comlearnmoremanufacturing-process-equipmentsafety personal-protective equipment safety signs warning

33. Timings, L.& Wilkinson, S. P. (2000). *Manufacturing technology* (Vol. 2). England: Pearson Education Limited Edinburg Gate H Essex CM 20 2JE.

34. Timings, R. L. (1998). *Manufacturing technology* (Vol. 1) England: Education Limited Edinburg Gate H Essex OM 20 2JE.

35. Wagner, W. H.& Kicklighter, C. E. (1991). *Modern woodworking: Tools Materials and Processes*. South Holland, lllinois. *The Good-Willcox Company.*

36. Wishart, D. and Watson, B. and Rowden, P. (2009). Protective Apparel Wearing: Observational Study Results from the Brisbane and Canberra Regions. *Journal of the Australasian College of Road Safety,* 20(4). Pp 52 – 59.

37. Wortman, C. B., Loftus, E. F. & Marshall, M. E. (1992*). Psychology.* Graw- Hill.

38. Zimolong, B. & Elke, G. (2006).*Occupational Health and Safety Management. In G. Salvendy (Ed), Handbook of Human Factors and Ergonomics.* New York: Wiley

APPENDIX A

UNIVERSITY OF EDUCATION, WINNEBA –KUMASI

DEPARTMENT OF DESIGN AND TECHNOLOGY EDUCATION

FACULTY OF VOCATIONAL AND TECHNICAL EDUCATION

QUESTIONNAIRE FOR ARTISANS

This questionnaire is designed to gather data on Occupational Safety Management in Motorcycle Workshops in Bolgatanga Municipality in the Upper East Region of Ghana. This research work is being carried out by a Master of Technology Student of the above mentioned department of the University of Education, Winneba, (Kumasi Campus).

Bolgatanga has been selected for the study and you are kindly requested to provide responses to the questions to enable the researcher contribute to knowledge in the field of study.

The information is for academic purpose only and will be treated with the utmost confidentiality.

Please, tick [√] the appropriate response and fill in the space where possible.

Thank you.

1 What is your gender?

[ ] Male [ ] Female

2 How old are you?

[ ] 16-19 Years [ ] 20-24 Years [ ] 25-29 Years

[ ] 30-34 Years [ ] 35-39 Years [ ] 40-44 Years

[ ] 45-49 Years [ ] 50-55 Years

3 What is your marital status?

[ ] Married [ ] Single [ ] Divorce/Separate [ ] Widow

4 What is your position?

[ ] Master Craftsman [ ] Apprentice

5 What is your educational level?

[ ] Primary [ ] Technical School

[ ] Junior High School (J.HS) [ ] Vocational School

[ ] Middle School [ ] Polytechnic

[ ] Senior High School [ ] University [ ] others specify please……

6 How long have you worked as a motorcycle mechanic?

[ ] 1 – 5 years [ ] 6 – 10 years [ ] 11-15 years

[ ] 16-20 years [ ] 21-25 years [ ] 26-30 years

[ ] 36 -40 years and above

7 How long have you served as an apprentice?

[ ] 1 year [ ] 2 years [ ] 3 years [ ] 4 years

[ ] 5 years [ ] 6 years [ ] 7 years [ ] others specify please…….

8 Have you fully completed your apprenticeship?

[ ] Yes [ ] No

9 Were you certified, confirmed by your master at the end of the apprenticeship?

[ ] Yes [ ] No

10 Have you attended any training courses or seminars on industrial safety before?

[ ] Yes [ ] No

11 If yes how often do you attend such training courses or seminars?

[ ] Once a year [ ] Twice a year

[ ] Once every two years [ ] others (Specify)

12 Are such training courses or seminars useful and important to you?

[ ] Yes [ ] No

13 'If yes how have you benefited from the course or the seminars?

[ ] Once a year [ ] once every two years [ ] twice a year [ ] others specify…….

14 What new skills have you acquired from such training programms. ……

15 Who is the organizer of such courses or seminars?

[ ] National Road Safety Commission [ ] Factory Inspectorate department

[ ] District Assembly [ ] Rural Technology Facility (RTF),

[ ] Others, specify…….

16 Have your shop been visited by personnel from the department of factories inspectorate?

[ ] Yes [ ] No

17 If yes how often do they visit your shop?

[ ] Once a year [ ] Twice in a year

[ ] Once in two years [ ] Twice in two years [ ] Duration (Specify)

18 Do personnel from the Department of Factories Inspectorate conduct investigations into the events of accidents in your shop?

[ ] Yes [ ] No

19 Have you been provided with safety guidelines to work with?

[ ] Yes [ ] No

20 If yes, who provided you with the safety guidelines?

[ ] National Road Safety Commission [ ] Department of Factories Inspectorate

[ ] District Assembly [ ] Rural Technology Facility (RTF)

[ ] Others, specify……

21 Have you notified the Department of Factories Inspectorate about your business?

[ ] Yes [ ] No

22 Do you report all accident cases that happen in your shop?

[ ] Yes [ ] Sometime [ ] No

23 If yes who do you report to?

[ ] Department of Factories Inspectorate [ ] Ghana Police Service

[ ] Ghana National Fire Service [ ] National Road Safety Commission

24 Have you been prosecuted before for breaching safety rules?

[ ] Yes [ ] No

25 If 'yes', who prosecuted you?

[ ] Factories Inspectorate [ ] Ghana Police Service

[ ] Ghana National Fire Service [ ] National Road Safety Commission

26 Do you display warning signs in potential danger areas in your shop?

[ ] Yes [ ] No [ ] Some times

27 Do you have first aid box in your workshop?

[ ] Yes [ ] No [ ] Some times

28 Is your workshop well ventilated?

[ ] Yes [ ] No [ ] Some times

29 Do you have fire-fighting equipment to use in case of fire outbreak in your workshop?

[ ] Yes [ ] No [ ] Some times

30 Do you read instruction on the use of new motor bike before working on them?

[ ] Yes [ ] No [ ] Some times

32 Do you wear protective clothing such as overall when working?

[ ] Yes [ ] No [ ] Some times

33 Do you wear prescribed safety boot in the workshop?

[ ] Yes [ ] No [ ] Some times

33 Do you clean or cover oil or grease when they spill onto the floor?

[ ] Yes [ ] No [ ] Some times

34 Do you put on glove when handling sharp objects or filling?

[ ] Yes [ ] No [ ] Some times

35 Do you wash your hands well with clean water and soap before eating?

[ ] Yes [ ] No [ ] Some times

36 Do accidents occur in your workshop?

[ ] Yes [ ] No [ ] Some times

37 What are some of the common accidents in your workshop?

[ ] Yes [ ] No [ ] Some times

38 What are some of the effects of accidents in your workshop?

[ ] Yes [ ] No [ ] Some times

39 How much does it cost to repair/service/overhaul a motorcycle?

[ ] Major repairs…….. [ ] Minor repairs……. [ ] New assemble……..

40 Do you have an association?

[ ] Yes [ ] No [ ] Some times

APPENDIX B

UNIVERSITY OF EDUCATION, WINNEBA –KUMASI

DEPARTMENT OF DESIGN AND TECHNOLOGY EDUCATION

FACULTY OF VOCATIONAL AND TECHNICAL EDUCATION

CHECKLIST FOR OBSERVING SAFETY PRACTICES AND CONDITIONS

This checklist is design for non-participant observation by the researcher to ascertain the authenticity or reality of the response from the respondents regarding some of the practices and conditions in various Motorcycle Workshops in Bolgatanga Municipality.

Please, all information is purely for academic purpose only and will be treated with the utmost confidentiality as such.

Please, tick [√] the appropriate response and fill in where possible.

Thank you.

1 (a) Do the artisans wear prescribed safety boots?

[ ] Yes [ ] Sometimes [ ] No

(b) If **No** specify: ……...

[ ] Sandals [ ] Bathroom slippers [ ] Canvas boots [ ] Old tattered shoes

2 Do the artisans wear well-fitting overall?

[ ] Yes [ ] Sometimes [ ] No

3 Do you put on gloves when handling components with sharp edges?

[ ] Yes [ ] Sometimes [ ] No

4 Are tools well arranged in the workshop?

[ ] Yes [ ] Sometimes [ ] No

6 Do they wear goggles when grinding or chipping?

[ ] Yes [ ] Sometimes [ ] No

6 Do you always clean the shop and arrange tools and equipment properly after the day's work?

[ ] Yes [ ] Sometimes [ ] No

APPENDIX C

UNIVERSITY OF EDUCATION, WINNEBA –KUMASI

DEPARTMENT OF DESIGN AND TECHNOLOGY EDUCATION

FACULTY OF VOCATIONAL AND TECHNICAL EDUCATION

QUESTIONNAIRES FOR THE DEPARTMENT OF FACTORIES INSPECTORATE

This questionnaire is designed to gather data on Occupational Safety Management in Motorcycle Workshops in Bolgatanga Municipality in the Upper East Region of Ghana. This research work is being carried out by a Master of Technology Student of the above mentioned department of the University of Education, Winneba, (Kumasi Campus).

Bolgatanga has been selected for the study and you are kindly requested to provide responses to the questions to enable the researcher contribute to knowledge in the field of study.

The information is for academic purpose only and will be treated with the utmost confidentiality.

Please, tick [√] the appropriate response and fill in the space where possible.

Thank you.

1 .Do you visit and inspect safe working conditions and safe act at motorcycle workshops?

[ ] Yes [ ] Sometimes [ ] No

2. If 'yes', how frequent do you visit the place?

[ ] Once in a year [ ] Twice a year [ ] Once in two years [ ] any other, specify please…….

3. Do you periodically organize seminars on industrial safety to sensitize motorcycle mechanics?

[ ] Yes [ ] Sometimes [ ] No

4. If 'yes', how often do you organize such seminars?

[ ] Once a year [ ] Twice a year [ ] Once in two years [ ] others specify ……

5. What impact have such seminars had on the motorcycle mechanic?

……

6. Do you give certificates to inspected and approved shops in the Municipality?

[ ] Yes [ ] Sometimes [ ] No

MR. STEPHEN AYINE REPAIRING A GEAR BOX WITHOUT WEARING PROTECTIVE CLOTHING

Mr. Joseph Akolgo Fixing a Gear Lever without Wearing Protective Clothing

Mr. John Adongo Overhauling an Engine without Wearing Protective Clothing

Mr. Razak Ibrahim Changing oil without Wearing Protective Clothing

Mr. Ambrose Dery Removing a Piston without Wearing Protective Clothing