

ADDIS COLLEGE
SCHOOL OF GRADUATED STUDIES
DEPARTMENT OF CONSTRUCTION TECHNOLOGY
AND MANAGEMENT

**CAUSES AND EFFECTS OF OCCUPATIONAL ACCIDENTS IN PUBLIC
BUILDING CONSTRUCTION COMPANY LOCATED IN LEMI KURA SUB-CITY.**

BY
REDIET SHEFERAW

ADDIS ABABA, ETHIOPIA
NOVEMBER, 2022

**ADDIS COLLEGE
SCHOOL OF GRADUATED STUDIES
DEPARTMENT OF CONSTRUCTION TECHNOLOGY
AND MANAGEMENT**

**CAUSES AND EFFECTS OF OCCUPATIONAL ACCIDENTS IN PUBLIC
BUILDING CONSTRUCTION COMPANY LOCATED IN LEMI KURA SUB-CITY.**

**BY
REDIET SHEFERAW**


**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF SCIENCE IN CONSTRUCTION
TECHNOLOGY AND MANAGEMENT.**

**ADDIS ABABA, ETHIOPIA
NOVEMBER, 2022**

CERTIFICATION

This is to certify that “Rediet Sheferaw Zeamanuel” had carried out her study on the topic entitled “Causes and Effects of Occupational Accidents in Public Building Construction Company located in lemi kura sub-city.”, under my supervision. The work is original and is appropriate for the award of the Master’s Degree in Construction Technology and Management.

Name of Advisor
Dr.Eng.AkliluAsfaw

Signature


Date
19/11/2022

As members of the Board of Examiners of the dissertation Open Defense Examination, we certify that we have read, and evaluated the MSc thesis prepared by Rediet Sheferaw Zeamanuel and examined the candidate. We recommended that the thesis be accepted as fulfilling the thesis requirement for the MSc degree.

Approval of Board of Examiners

Name	Signature	Date
Chairperson _____	_____	_____
External Examiner _____	_____	_____
Internal Examiner _____	_____	_____

DECLARATION

“I Rediet Sheferaw Zeamanuel, declare that this research paper entitled Causes and Effects of Occupational Accidents in Public Building Construction Company located in Lemi Kura sub-city is the result of my own work, it contains no materials previously published or written by another person except where due reference is made. This report has not been previously submitted for any degree at other higher education institutions. I have carried out the paper independently with the support and guidance of the research advisor Dr. Eng. Aklilu Asfaw”.

Signature

Date

ACKNOWLEDGEMENT

First of all, I thank and glorify the Almighty GOD for the courage and strength I got to undertake this research. It gives me great pleasure to honor those who contributed their precious time in reviewing and commenting the report while conducting this research.

I would like to thank my advisor Dr.Eng.AkliluAsfaw for his valuable and constructive comments on the paper. I am also very grateful to Engineer Zebenay Wubishet for her concern and support in reviewing and providing constructive feedback on the report. In addition, I am thankful to those construction companies' employees for giving me their precious time filling questionnaires voluntarily. At this occasion, I am very glad to thank all my family members for their appreciation and consistent care towards all my efforts.

TABLE OF CONTENTS

DECLARATION	II
ACKNOWLEDGEMENT	III
LIST OF TABLES	VI
LIST OF FIGURES	VI
ACRONYMS	VII
ABSTRACT	VIII
CHAPTER ONE	1
1.1. Background of The Study	1
1.2. Statement of The Problem.....	3
1.3. Objective of The Study	4
1.3.1 General Objective.....	4
1.3.2 Specific Objective	4
1.4. Research Question.....	5
1.5. Scope of The Study	5
1.5.1. Thematic Scope of The study.....	5
1.5.2. Spatial scope of the study.....	5
1.5.3. Temporary scope of the study	6
1.6. Significance of the study	6
1.7. Limitation of The study.....	6
1.8. Structure of The Research Paper.....	7
1.9. Operational Definition	7
CHAPTER TWO	9
2. LITERATURE REVIEW.....	9
2.1. Introduction.....	9
2.2 Theory of accidents	9
2.3. Theoretical studies	11
2.4. Empirical studies.....	13
2.5. Policy and Strategy	14
2.6 Best Experience and Lesson Learnt	15
2.7. Conceptual Framework	16
2.8 Research Gap	18
CHAPTER THREE.....	19
3. MATERIAL AND METHODS	19
3.1. Research Design.....	19
3.2. Research Approach	19
3.3. Population and Sample.....	19
3.3.1. Target Populations	19
3.3.2. Sampling Method and Sample Size	20
3.4. Types and Source of Data	21
3.4.1. Primary Source.....	21
3.4.2. Secondary Source.....	21
3.5. Data Collection Instrument	21
3.5.1. Questionnaire	22
3.6 Methods of Data Analysis.....	22
3.7. Variable Selection and Model Specification.....	22

3.8. Reliability and Validity	23
3.9. Ethical Considerations	24
CHAPTER FOUR	25
4. RESULTS AND DISCUSSION	25
4.1. Introduction	25
4.2. Demographic Characteristics of Respondents	25
4.3. Work Environment and Behavioral Factors of The Respondents.....	27
4.4. Types of Major Cause and Seriousness of Occupational Accident	28
4.5. Classification of Major Cause of Occupational Accident.....	30
4.6. Descriptions and Analysis of Factors Contributing to Accident.....	33
4.7. Correlation Analysis.....	36
4.8. Test For Variable.....	38
4.8.1. Multicollinearity Test.....	38
4.8.2. Linearity and Normality.....	39
4.9. Regression analysis	41
4.10. Discussion of the result	44
CHAPTER FIVE.....	47
5. CONCLUTIONS AND RECOMMENDATIONS	47
5.1. Conclusions	47
5.2. Recommendations	48
5.3 Recommendations For Further study	49
REFERENCE.....	50
APPENDIX1-RESEARCH QUESTIONNAIRE.....	53

LIST OF TABLES

Table3. 1. Sampling technique	21
Table3. 2. Result of Reliability Analysis for the Questionnaire.....	24
Table4. 1. Demographic characteristics of respondents.....	26
Table4. 2. Work environment and behavioral factors	28
Table4. 3. Types of Major Cause and Seriousness of occupational Accident.....	29
Table4. 4. Generic set of cause.....	32
Table4. 5. Description and analysis of factors contributing to accident	35
Table4. 6. Interpretation of r value	36
Table4. 7. Correlations of variable	37
Table4. 8. Multicollinearity Test	39
Table4. 9. Model summary.....	41
Table4. 10. ANOVA.....	42
Table4. 11. Coefficient's	43

LIST OF FIGURES

Figure 2 1. Conceptual frame work explaining the relationship between basic causes and occupational accident source.....	17
Figure4. 1: Normality.....	40

ACRONYMS

GDP Growth Domestic production

HS Health and Safety

HSE Health and Safety Environment

ILO International Labor Organization

PPE Personal Protective Equipment

RII Relative Importance Index

WHO World Health Organization

ABSTRACT

This study examined Causes and Effects of Occupational Accidents in Public Building Construction Company located in lemi kura sub-city. To determine the major causes of occupational accident and the effect of basic cause in public building construction project. Explanatory research design and quantitative methods were used for collecting data from randomly selected construction companies. These companies were grouped into three by stratified samplings and 120 respondents were selected from each firm. Both primary and secondary data were gathered through structured questionnaires and analyzed through descriptive and inferential statistics. The findings show that the major causes of accidents in the building construction company were the outcome of three main generic factors such as technical, human, and organizational. Such factors brought their own specific causes. These were the inappropriate state of the material, job site conditions, management factors, unsafe acts, unsafe conditions, and the human element. The correlation results indicated that there is a positive relationship between the factors and occupational accidents. The results of the regression test showed that independent variables/factors/ was significantly contributed to variance at a significance level of 0.05. Furthermore, all independent variables were jointly significant and strong combined effect on accidents of R square 0.915. This implies that independent variables described up to 91.5% of the change and increases in accidents in construction sectors. Moreover, individually all independent variables were a positive significant effect on the occurrences of occupational accidents in construction sectors. Therefore, the researcher recommended that the management creates intensive awareness of both health and safety issues for the protection and creation of safety environment in the construction sector.

KEY WORDS:-Public Building Construction Company, Management factor, Occupational accident, Generic factors.

CHAPTER ONE

1. INTRODUCTION

Causes and Effects of Occupational Accidents in Public Building Construction Company located in Lemi Kura sub-city. This chapter presented the background of the study, statement of the problem, objective of the study, research question, and significance of the study, limitation of the study and structure of the research paper.

1.1. Background of the study

The construction industry and its related project and site, where construction activities are performed, are the most hazardous places with higher risk accidents, human injuries and damages. Occupational accidents in the construction not only influence personal safety and health, but also have negative impact on the economy of the world (ImHJ et al., 2009). In the construction industry workers perform different kinds of activities each of which has its own damage. As a result, it is a high risk of accident occurrence. The reasons are time, cost, and quality which are always the main factors considered against safety. Safety issues are always considered secondary and take a back seat in construction. Many employers have not established comprehensive accident prevention policies, but instead concentrated on maximizing profit.

It is widely recognized as having high accident rates, which results from absences of work, loss of productivity, permanent disabilities and even fatalities (Fung et.al., 2009). Apart from causing human tragedies construction accident also delay project progress, increase costs, and damage the reputation of the builder (Gangoellset.al., 2010). A detailed critical analysis of accidents in the construction industry is immensely important. Therefore, based on the analysis post-accident protocols, can be stated that there could be several causes of an accident and that they may be very different. Causes of accidents results from many factors that occur in the work environment, which is favorable circumstances, can significantly increase the probability of the hazard becoming operational and consequence leading to an occupational accident. According to Stephen T., (2008) ‘‘a factor is one of the causes that generate an effect’’. In the analysis of occupational safety, a factor should be understood as all materials

and non-materials, activities that directly or indirectly affect a construction employee and have an impact on the accident rate phenomenon. According to Raczkowski, (2005) occupational hazards are distinguished as dangerous, harmful and cumbersome. Nawrot, (2006), proposed dividing accident factors into hidden, overt and unknown. Hidden factors include culture, social atmosphere, habits, laws, school, education and personal policy. These are factors that impact of which occupational safety is universally unquestionable. However, the possibility of their clear estimation is difficult or impossible. In turn overt, factors are the subject of detailed research and they result from construction, technology, execution, and supervision. In addition unknown factors may occur in the work environment. There are factors that we sense intuitively, but cannot be proved.

Some studies have attempted to relate personal and work characteristics such as age, ethnicity, gender, occupation, and work experience to accidents. These factors could indicate the relationship between accidents and human physical condition and occupational qualities. They can also help identifying the group of construction workers who are highly prone to accidents. For example, Hinze et al., (2006) found human errors are mainly responsible for construction accidents. Moreover site condition or work environment play an important role in construction accidents. According to Chi et al., (2013), construction sites are often labeled to as unsafe, dangerous, or hazardous places to work. The fact that construction activities are diverse with changing project teams and difficult to handle materials and equipment, would lead to human errors that are uncontrollable. The impact of the above generic sets of causes of accident on occupational health and safety hazards faced by construction workers in developing countries higher than those industrialized countries. Developing countries like Ethiopia are striving hard to improve their basic amenities by building schools, hospitals, housing complexes, highways, power plants, industries, and other infrastructure. That is, public construction shared an average annual rate of 58.2% of the capital budget between years 1998-2002 (Wubshet, 2004), moreover, the construction industry accounted for 8.5% of total GDP between years 2011-2014 (MoFed, 2014). This shows construction industry plays a significant role in Ethiopia's economic development.

However, construction projects pose enormous challenges to not only finish within an owner's schedule and budget, but also estimate and minimize harmful impacts to the

environment. The reasons of this were the absence of professional workers and problems of health and safety procedures. Moreover, work related construction accidents were the main feature of human injuries and damage. Therefore, the need of this paper is to study the effect of major causes of occupational accidents in building construction industry especially in Addis Ababa, located in Lemi Kura sub-city, and recommending the base and upper proposed prevention system of accidents in the industry.

1.2. Statement of the problem

There are problems in Ethiopian construction industries concerning occupational accident in different building construction projects. Nowadays, occupational accidents have become a common problem in building construction projects in Addis Ababa. In the construction industry workers perform different kinds of activity each of which has its own damage. One of the most important safety issues in the construction industry is that all working-class, including workers, technicians, foremen, and supervisors who are responsible for project management and control are exposed to work hazards either directly or indirectly (Pinto et al., 2011 and Bardanet et al., 2012). Some researchers have found various factors of safety performance in the construction industry, which can be used for the occupational accident analysis and assessment of construction industry (Tam Cm et al., 2011 and Chang CWet al., 2010).

The International Labor Office (ILO) estimates that every year there are 125 million work related accidents, 220,000 of them fatal. According to WHO, 160 million new cases of occupational disease are covered annually by exposure and dangerous conditions at the work place: 30-40% of them can be expected to lead to chronic diseases and about 10% are likely to result in permanent disability. Annually throughout the world, an estimated 271 million people suffer from work related injuries and 2 million die from these injuries. In most countries throughout the world the construction industry constitute to account for disturbingly a high proportion of fatal and nonfatal injuries and the International Labor Organization (ILO) estimates that more than 100,000 construction workers around the world die every year. Therefore, worldwide, occupational accidents in construction projects are severe problems and some studies show that construction industry and its related sites are dangerous and high risk environments the consequence of which can lead to adverse and catastrophic accident.

Moreover, occupational safety and health profiles of Ethiopia (2014) describe the statistics of occupational accident in construction industry as the most hazardous. The construction sector is constituted 29.5% of the total occupational accident. As the study conducted on the Addis Ababa condominium housing building project by Mola M, (2016) found that the three leading occupational injuries of the project. These were puncture (21.0%), followed by a hand injury (11.3%) and back pain (9.7%). According to the study, the main causes of those injuries are not using Personal Protective Device. He used the Relative Importance Index (RII) to analyze them. However, the above results were not seen the agents or sources of the main factors that affect occupational accident in building construction project, and the extent to which the agents' effect of occupational agent was not clearly described.

Meanwhile, the subsequent problems have been indicated in accidents on construction projects in which a highly risk to the workers lives and absence of appropriate health and safety policies would result in the most hazardous occupation than the other sectors. Therefore, the stated problems initiated the researcher to investigate the major sources, causes and effects of occupational accidents in the Public Building Construction Project of Addis Ababa, located in Lemi Kura sub- city. This study is try to address the issue of the agents of occupational accident, the cause of occupational accident, and the effect of a major cause on occupational accident in Lemi Kura sub-city administration in Addis Ababa.

1.3. Objective of the study

1.3.1 General objective

The general objective of the research is; Causes and Effects of Occupational Accidents in Public Building Construction Company Located in Lemi Kura Sub-city.

1.3.2 Specific objective

The specific objectives of the study are:

- To examine the generic sets of causes of accidents in public Building Construction Company.
- To investigate the relationship between basic causes and occupational accident.
- To analyze the effects of the basic causes on occupational accidents in a public Building construction

1.4. Research Question

The research questions of this study are:

- What are the most influential generic sets of causes of accidents in Construction Company?
- Is there a relationship between the basic causes and occupational accident?
- How to analyze basic causes influence on occupational accidents?

1.5. Scope of the study

1.5.1. Thematic scope of the study

This research includes set of Causes and Effects of Occupational Accidents in Public Building Construction Company located in lemi Kura sub-city. Additionally, in conceptual consideration, the study focused on the major sources, causes and effect of occupational accidents in construction projects which were greatly associated on occurrence of accidents. Such generic sets were Technical cause, Organizational cause and Human causes. The researcher was used both descriptive and inferential statistics for analysis purposes. Inferential statistics tools “correlation analysis and multiple linear regression” was used to predict the relationship between Agent of occupational accident and the effect of major cause of occupational accident.

1.5.2. Spatial scope of the study

This study focuses on public building construction company located in Lemi Kura sub-city 20/80 condominium housing project were selected by purposive sampling methods because the major housing demand and a large number of construction projects have been made under the subsection of 20/80 housing projects So that the studies confide only 20/80 condominium housing project of Lemi Kura subs-city administration so, the researcher focus on three sites those are Project 14 /GoroSilase site, Kolfe /YekaTafosite and Project 13/ Bole Arabsa site.

1.5.3. Temporary scope of the study

This research use quantitative research approach. The primary data were collected on June 2022G.c. the data consists of materials that gathered by the researcher through systematic observation and the results of questioners and secondary data were gathered from previous data that gathered in a year 2021G.c.

1.6. Significance of the study

The study investigates Causes and Effects of Occupational Accidents in Public Building Construction Company located in lemi kura sub-city, Addis Ababa. The rationale behind this study was interacted by a higher risk of health and safety for workers in construction projects compared to workers of other industries which have caused high risks of occupational accidents/injuries. The study, therefore, serves as a contribution to officials of the construction sector by identifying the top causes of construction accidents in order to take measures for improving the health and safety procedures of construction projects. At the same time, the findings of the study are used as a source of literature review and provide data from which further studies could be included. Moreover, the findings and results of this study will provide the policymakers like the government, ministry of construction which is valuable insight and a more reliable guide for monitoring the impacts of construction accidents in the country. Besides these, the study will provide the stakeholders like the government, clients, consultants, contractors and etc. With available information will allow them to provide useful suggestions to minimize accidents in construction industries. Finally, although the study is limited to building construction companies, other construction sub-sectors, regions, or entire the country together with least developing countries will similar conditions will find the result useful in their safety and health workers in construction projects.

1.7. Limitation of the Study

This research has some limitation that offers opportunities for future researchers. Since this study is limited only on one sub-city sites located in Lemi Kura sub-city of Addis Ababa, it is difficult to generalize the findings to other building construction industry. The other limitation of this research was regarding the variables considered that affects building construction project, in this study mediatory variables were considered. Furthermore, this research approached only

used quantitative methods and also the questionnaires used were closed-ended items, it might lack content coverage. In addition to this, there were limitation encountered the researcher. To mentions some of these drawback, unwillingness of the respondents' to fill the questionnaires even though the researcher tried to clarify the purpose and direction of the study. Rather some respondents were not dedicated enough to respond the questionnaires.

1.8. Structure of the Research paper

Research writing is the final step of the study and it contains five main chapters. These are the introduction, literature review, research methodology, Data analysis and discussions, and finally conclusion and recommendations.

Chapter One: Introduction: This chapter comprised the background of the study, problem statement, aim and objectives, significance and limitations of the study, and structure of the research.

Chapter Two: Literature Review: The literature review started with a literature exploration of electronic and hard copy media in answering the research objectives.

Chapter Three: Material and Methods: This chapter discussed the tools and methods used for data collection.

Chapter Four: Results and Discussion: This chapter constituted the analysis of data gathered with the research instruments. It analyzed data from desk studies and questionnaires.

Chapter Five: Conclusions and Recommendations: This is the final chapter of the research in which conclusions and recommendations were drawn based upon the analysis data, linking them to the problem statement and objectives of the study.

1.9. Operational Definition

Causes of occupational accident: all deficiencies and irregularities related to the employee and their abnormal behavior, material factors, general organization of work and work place.

Accident severity rate: the severity of accidents based on the combination of the number of lost days and victims hospitalized for treatment and the quantity and monitoring induced by accident analysis. Moreover, it is used to assess the health and safety and environment (HSE) performance and safety problems in the industry. It is calculated based on work days lost due to accidents. Then:

Minor: Represents accidents no lost days or hospitalization.

Serious: Incidents more than ten days lost.

Fatal: Accidents with death.

Technical cause: The generic sets of causes of accident in construction project which results from inappropriate state of materials and equipment.

Organizational cause: The driving causes of accident as results of general work and work place in construction projects.

Human cause: This types of generic causes results from human errors, unsafe acts and unsafe conditions in order to generate occupational accidents.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. INTRODUCTION

Whether on small projects or a major commercial development, on daily basis construction workers must deal with some of the most dangerous working condition faced by employers in any industry (ILO, 2010). A Construction site by in nature is full of hazards even for Avery experienced worker. Accidents still occur and doubly continue to occur due to both the nature of the work itself and the variety of hazards faced by the construction workers. The fault of accidents lies with the system, environment, and people involved in construction activities. An accident can be defined as unplanned, unexpected and uncontrolled event. An accident does not necessary result injury. It can be in terms of damage to equipment and materials and especially those that result in injuries receive the greatest attention (Hinze, 2009). All accidents regardless of nature of damage or loss should be of concern. Accidents that could not cause damage to materials or equipment, or injuries to personnel may foretell future accidents with less desirable results.

The cause of accidents in the construction industry is a multi-faced phenomenon mainly attributed to in adequate supervision, use of incompetent personnel, use of inappropriate construction techniques use of poor quality of materials coupled with lack of quality control to insure compliance with standards or specifications, work foundations, poor sit layout and other techniques.

2.2 Theory of Accidents

An accident can be defined as unplanned, unexpected and uncontrolled event. An accident does not necessary result injury. It can be in terms of damage to equipment and materials and especially those that result in injuries receive the greatest attention (Hinze, 2010). All accidents regardless of nature of damage or loss should be of concern. Accidents that could not cause damage to materials or equipment, or injuries to personnel may foretell future accidents with less desirable results.

Domino Theory: Henrich further contributed to the basic understanding of accident causation by developing the widely known Domino Theory. The domino Theory holds that accidents are not random acts of fate that just happen out of the blue. This theory uses the analogy of 5 Dominos standing up on the thin base side and when one falls it will push the other down all tumbling toward injury. The theory is designed to help practitioner identify intervention points, points that, if acted on, will yield a different outcome, a more favorable outcome such as no accident or an event that does not lead to injury or property damage. If you eliminate just one, any one of the first four Domino's that have aligned then the Domino's was not complete the sequenced fall and no injury result. Domino Theory

- Ancestry and Social Environment (negative character traits leads to unsafe behavior can be inherited, Can be acquired)
- Fault of Person (the above is why people behave in unsafe manner)
- Unsafe acts (committed by people and mechanical hazards are the causes of accidents)
- Accident
- Injury if you eliminate any one of the first four factors then you can prevent the injury.

Energy Release Theory:

Another theory that has gained respect is the energy release Theory which compares the rate of release of energy and relates to the kind of and severity of injuries. This theory focuses on the prevention of allowing energy to stores up in an uncontrolled way. The first step is to prevent the marshaling of energy by reducing the amount needed and/or providing vent release mechanisms. The next step would be to install control methods that modify the release rate which can be accomplished with the use of space (distance) and time. For example, a fixed barrier guard separates space by not allowing workers or machinery to reach a point of operation. This is a separation by space. Other controls techniques include strengthen the object that may release the energy to prevent such release.

Human Factors Theory:

The Human factors theory of accident causation holds that a chain of events that was caused by consistent human error lead to an accident. Factors that lead to human error.

- Overload (action that exceeds the ability of component to handle the amount)
- Inappropriate Response
- Inappropriate Activities

2.3. Theoretical Studies

Accidents in the construction work place are unplanned and unwanted occurrences involving movements of persons, objects or materials that may results in injury, damage, or loss of property or people (Abdelhamid, 2009). Theories and models of construction accidents causation are developed on the basis of describing how construction accidents happen. These theories and models illustrates are translated into an injury or loss. Heinrich's domino theory, as an example, proposed that one event leads to another, then to another and so forth, ending in an accident. The domino theory defined that 88% of construction accident are caused by unsafe acts, 10% by unsafe conditions, and finally 2% by acts of God. It is in tasting to notice that an 'act of God' concept in the domino theory implies the fact that there might be a level of risk which is not controlled (Abdel Hamid, 2009).

The domino theory represents a simple model based on singular concepts of risks. Subsequent theories and models of accident causation represented a higher level of signification and extensiveness. These subsequent theories defied immediate and contributing causes of accident. Immediate causes constitute unsafe acts and conditions while contributing causes include safety management performance and the mental and physical conditions. The later theories of accident causation express the significance of the management of the system, such as regulations for the cause of safety equipment and intervention for hazards correction. This idea is, however, overshadowed by an intense emphasis as the initial act of accidents with the worker acting unsafely or being in an unsuitable mental and physical state (Philip et.al, 2011).

There are some other accident causation theories, such as biased liability theory, states which once a construction worker has experienced an accident, the opportunity that the same work experienced further safety and health violation may either decrease or increase compared

to other workers. According to these former theories of accident causation, there is always a group of workers who are more likely to experience accidents. These models ignore the safety responsibility of management and put the whole the whole responsibility on the shoulder of workers. Training of workers in order to reduce risk tolerance is recommended in this type of accident causation theories. Human behavior is the basis and foundation of risk in the models (Mol, 2003).

According to these models, it is not easy to change the view to underlying problems rather than symptoms since the emphasis of the accident investigation is on "unsafe act" and unsafe conditions (Jha, 2011). It should be taken into account that many accidents happen not because of they are not preventable, but because the organization did not learn from previous accidents. Therefore, in preventing the re-occurrence of accidents in construction workplaces, the human dimension of accident causation should be taken into consideration at a macro or organizational level, rather than simply considering the individual worker level (Mol, 2012).

The interaction between the worker and the work environment, tools and equipment, and other contributing factors result in adverse effect in work systems which began a sequence of events leading to accident (Taylor, et al., 2004 and Jha, 2011). These theories of accident causation define that for instance, workers error may result in mistakes and deficiencies in design of equipment's. In addition, poor maintenance practice may intensify design of defects; therefore the combination these causes with poor operating routines may create violation from safety (Hughes et al., 2007).

The active failure can be noticed immediately, most of the time, while latent failures are noticeable just when they are combined with supplement causes to viola the system's defensive actions. The Reason's theory of accident causation challenges the inappropriate beliefs of managers which assume that systems are safe and to search for underlying variables (Mol, 2003).

Generally, the previous accident causation theories and models produced explanations of why accidents and incidents happen. All the construction accident causation theories and models developed have considerably increased the understanding of accident and how they happen. They have stimulated a strong and powerful emphasis on the role of human error which has

resulted into a reasonable place for training and education of workers in order to develop competencies and safety awareness. However, there is a fundamental dilemma which is the different interpretation of risk, safety, and the extent of risk which needs to be reduced to be acceptable. People are likely to believe that once an action is executed in response to hazards the situation is safe or safe enough.

The weakness of the accident causation theories is that they do not offer extensive strategic guidelines for managers and supervisors for reducing risks at the construction workplace. Moreover, these theories have implied in the inappropriate perception that accident in the workplace can be prevented in case human errors are eliminated. Such risk is beyond the human intervention, not all accidents are preventable. Strategies require to be revised in manner to manage the risk and workers need to be watch full of it. A great number of accidents can be prevented the safety management system reflects both natural degradation and these intrinsic threats. The initial step in developing such a system is preparing a model which shows the interaction between the accidents likelihood and organizational tasks and activities in the presence of these hazards.

2.4. Empirical studies

Tam et al., (2011) study in China found a variety of accident causes in China construction works (25 causes) such as poor safety awareness from top leaders, lack of training, poor safety awareness of project managers, reluctance to input resources for safety, reckless operation, lack of certified skill labor, poor equipment, lack of first aid measures, lack of resources enforcement of safety regulation, lack of organizational commitment, low education level of workers, poor safety, the conscientiousness of workers, lack of personal protective device, ineffective operation of safety regulation, lack of technical guidelines, lack of strict operational procedures, lack of experienced project managers, shortfall of safety regulation, lack of protection in material transportation, lack of protection in material storage, lack of teamwork spirit, excessive overtime work for labor, shortage of safety management manual, lack of innovations technology and poor information flow.

According to Goh, Omar, Toh and Zin, (2016) the cause of accident at high rise building construction site was worker's lack of training, workers acts, unsafe condition, poor site safety management and less awareness of hazardous activities at work site. According to Abdelhamid

and Everett (2011) classified the accident caused by US construction works into human and physical factors. According to Lubega et al., (2000), the causes of accidents in Uganda's construction works are a lack of awareness of safety regulations, lack of enforcement and safety regulations, and poor regard for safety by people involved in a construction project. Pipitsu Paphol and Watanabe, (2010), study in Thailand found that the accidents in Thailand's construction works are failure of personal protective devices, improper loading or placement of equipment or supplies, failure to warn co-workers or security equipment, and improper use of equipment.

Previous studies on construction accidents have looked at the causes, types of injuries, and their magnitude and places of injuries and types of occupations that are vulnerable. One of the recurring themes in most of this study is the disproportional ratio of fatal to nonfatal accidents in the industry. Thus the majority of accident prevention strategies mainly look at fatal accidents (IM HJ, 2009). At the same time, prior literature provides that the construction industry is one of the most hazardous industries. It marginalizes productivity, quality, and time and negatively affects the environment which consequently adds to the cost of construction Mohammed (2011) and in most developing country health and safety consideration in construction project delivery is not given priority and employment of safety measures during construction is considered a burden (Mbuya, 2014). And the lack of information and experience limits the intervention process of improving the health and safety working environment on the construction site (Adan, 2016).

In general, the above literature shows that accidents are caused by a wide range of factors, some which are unsafe acts, unsafe methods, the unique nature of the industry, and site condition.

2.5. Policy and strategy

The magnitude of the global impact of occupational accidents and diseases, as well as major industrial disasters, in terms of human suffering and related economic costs, have been a long-standing source of concern at workplace, national and international levels. Significant efforts have been made at all levels to come to terms with this problem, but nevertheless ILO estimates are that over 2 million workers die each year from work-related accidents and diseases, and that globally this figure is on the increase. OSH has been continues to be a

fundamental requirement for achieving the objectives of the Decent Work Agenda. In addition to established measures to prevent and control hazards and risks, new strategies and solutions need to be developed and applied both for well-known hazards and risks such as those arising from dangerous substances, machinery and tools and manual handling as well as for emerging issues, such as biological hazards, psychosocial hazards and musculo-skeletal disorders.

The development of an appropriate response to these issues should rely on and make use of the collective body of knowledge, experience and good practice in this area. Safety and health measures are undertaken to create and sustain a safe and healthy working environment; furthermore, such measures can also improve quality, productivity and competitiveness. Although effective legal and technical tools, methodologies and measures to prevent occupational accidents and diseases exist, there is a need for an increased general awareness of the importance of OSH as well as a high level of political commitment for effective implementation of national OSH systems. Efforts to tackle OSH problems, whether at international or national levels, are often dispersed and fragmented and as a result do not have the level of coherence necessary to produce effective impact. There is thus a need to give higher priority to OSH at international, national and enterprise levels and to engage all social partners to initiate and sustain mechanisms for a continued improvement of national OSH systems. Given its tripartite participation and recognized global mandate in the area of OSH, the ILO is particularly well equipped to make a real impact in the world of work through such a strategy. The fundamental pillars of a global OSH strategy include the building and maintenance of a national preventative safety and health culture and the introduction of a systems approach to OSH management.

2.5 Best Experience and Lesson Learnt

Construction accidents are usually the most common workplace accidents, mainly due to the nature of work. Employers must provide safe and conducive work environments for their employees. Various regulatory bodies like the Occupational Safety and Health Administration (OSHA) are keen on ensuring employees are safe. OSHA is a regulatory organization that works under the labor department to minimize workplace accidents.

OSHA defines workplace accidents as unplanned events that cause damage to property or personal injury. Therefore, workplace accidents do not constitute intentional occurrences.

According to OSHA, workplaces should have a Safety and Health Management System (SHMS) to reduce accidents. SHMS is a program for preventing workplace accidents. OSHA strives to reduce workplace accidents by ensuring that all employers adhere to OSHA standards and laws. The organization also provides workplaces with assistance, training, and outreach. Occupational injuries can be caused by multiple factors depending on the workplace environment and nature. They can also result in various types of injuries depending on the accident. Some of the most common workplace cause of accident includes:

- Overexertion. It is the leading cause of accidents in the workplace. It can be caused by lifting, pulling, and carrying work equipment or material. Overexertion injuries cause muscle strain. Individuals who conduct repetitive manual tasks over a long time with no breaks can experience overexertion.
- Fall injuries. Falls can happen in workplaces that do not have an SHMS to protect their employees. They can be falls from high point areas such as roofs, skyscrapers, and ladders. Falls are dangerous since they can cause loss of life, fractures, or paralysis.
- Slips and trips injuries. Injuries from trips and slips are the most common in workplaces and are caused mainly by poor lighting or flooring. Slips and trips caused by flooring may be due to uneven floors, wet slippery floors, or clutter. They can result in broken bones or long-term back pains.
- Falling objects injuries. High-risk industries have a higher probability of accidents from falling objects such as debris, poorly stacked loads, or poor handling of machinery. Injuries from falling objects can cause fractures, head injuries, or blindness.
- Repetitive motion injuries. These injuries result when individuals use improper repetitive routines to do tasks over time. For example, scrubbing a floor the same way for years can cause repetitive motion injuries. They primarily affect the nerves, tendons, muscles, and ligaments.

2.6. Conceptual Framework

Based on the literature review, the researcher tries to postulate occupational models, as shown in the figures below, in which due to the degree of their association with an accident. Therefore, an occupational accident can result from immediate or basic causes that directly produce the accident and are composed of unsafe acts (inappropriate behavior of the worker that

could result in workplace incident) and unsafe conditions (facilities, equipment, machinery that are faulty and that takes place the workers at risk of having an accident). But to achieve an effective solution to occupational accidents, it is critical to identify and control the basic causes which result in the immediate causes, they include personal factors (incorrect work habits, incorrect use of equipment, tools, or facilities, physical or mental defects, hearing deficiencies etc.) and work factors (deficient supervision and leadership., unsuitable policies, procedures, guidelines or practice, unstable work planning or schedule.

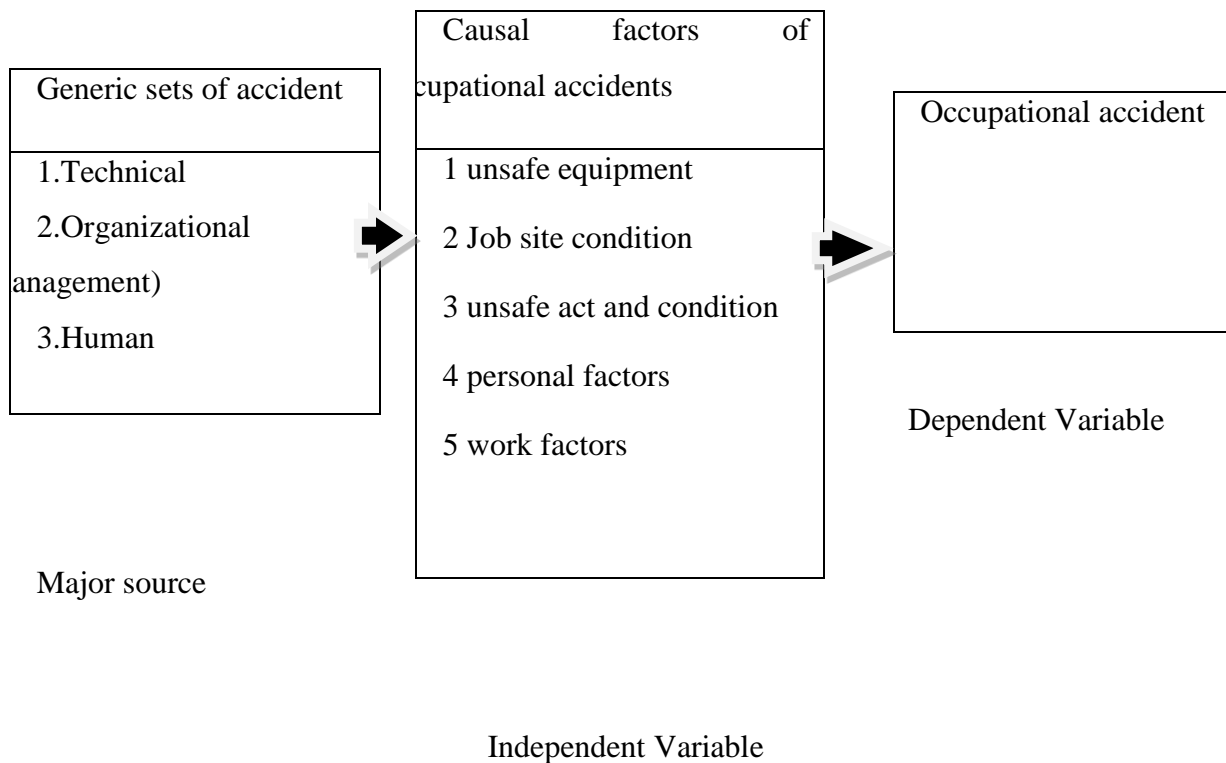


Figure2.1: Conceptual frame work explaining the relationship between basic causes and Occupational accident Source; Own presentation.

From the above discussion, most of occupational accidents are generally the results of three types of generic causes: Technical, Organizational and Human. Therefore, the sub-groups of causes of occupational accident: namely

1. Inappropriate state of material or unsafe equipment
2. Job site considerations

3. Unsafe act and condition

4. Personal factors

5. Works factors

These are the sum of technical causes, organizational causes and human causes. That means the technical cause includes inappropriate state of the material, organizational cause include job site considerations and management factors and human cause includes unsafe act, unsafe conditions and human elements. In addition, in each of these sets several or more specific causes are described during the time of data analysis.

2.7 Research Gap

In Ethiopia many studies found only personal factors as the Cause of occupational Accident on Public building construction project. On this study the main gap is technical, organizational and human cause are generic source for Occupational Accident and the effect of Major cause of occupational accident on building Construction Company

This study addresses the gap:

- By examining the generic set of cause of Occupational Accident.
- By study the relationship between the Major cause and occupational accident and finally analyze which cause have more influence.

CHAPTER THREE

3. MATERIAL AND METHODS

In this chapter the mechanism or processes used to gather information and data for the purpose of decision making in the study will be described.

3.1. Research Design

According to Boru (2018), research design is defined as the overall plan for connecting the conceptual research problems and sets the procedure on the required data, the methods to be applied to collect and analyze this data, and how all of this is going to answer the research question. This study focused on identify the major cause of occupational accidentin construction company, In the case of Lemi Kura sub-city, thus the study adopted explanatory research designs; this design tries to connect the cause of occupational accident with their effects on construction project. (Akhtar, 2016), defined that explanatory research design is used to formulate a problem for specific investigations, or aim at formulating research design. This design always carries with it a set of concept that guides the researcher to look for the facts.

3.2. Research approach

The three known research strategies: qualitative, quantitative and mixed methodologies are known by researchers. Quantitative research focuses on quantification in the collection and analysis of data. On the other hand qualitative research strategy usually emphasis words in the collection analysis of data. Mixed research strategy combines the elements of quantitative and qualitative research approaches. For this study the quantitative methods of research was chosen to collect data on the major causes of occupational accidents on construction projects in Addis Ababa, in case Lemi Kura sub-city.

3.3. Population and Sample

3.3.1. Target Populations

According to Hair et al., (2006), a target population refers to the entire group of individuals or objects to which researchers are interested in generalizing the conclusions.

The study was undertaking the effect of the major causes of occupational accidents on building Construction Company of Addis Ababa, In the case of Lemi Kura sub city. The essence

of the case study in this context is to apprise the safeties of Ethiopian construction industry with emphasis on Addis Ababa being the capital city both local and multinational construction firms. Therefore, Addis Ababa is an excellent sample of what is happening in the country as a whole. A comprehensive selection of some reputable construction firms in Addis Ababa was carried out. As such the researcher purposively selected Lemi Kura sub city as a sample sub city because different construction grades are involved in different construction works. Therefore, the target population of this study was confined in Addis Ababa Lemi Kura sub-city construction company employee. In the sub city there are large numbers of heterogeneous populations. So by considering educational status, work experience, number of machinery and their capital the ministry of construction arranged the firms in to seven (7) grades.

Therefore, the target population of the study was included stakeholders of public building construction project in Lemi Kura sub-city administration namely are Project 14 /GoroSilase site, Kolfe /YekaTafosite and Project 13/ Bole Arabsa site. 172 of the target populations were determined.

3.3.2. Sampling Method and Sample Size

Due to the nature of data was being collected from the expected participants for survey study, a probability sampling was preferred to use. A stratified sampling method was adopted to select the population for the study. Because there is a heterogeneous population. So the study was used stratified sampling techniques to select the representative sample of the study by using Devaus (2002) formula.

Therefore, in order to determine the sample size, the study will use the Devaus (2002) formula as follow

$$\text{Sample Size} = \frac{N}{1 + (Ne^2)} = \frac{172}{1 + (172 \times 0.05^2)} = \underline{\underline{120}}$$

Where:

N= Size of Population

e= sampling error, equal to 0.05

Therefore, the sample size of the study was 120. Then to estimate the number of sample from each agent, this study was used proportional technique.

Table3. 1.Sampling technique

Sampling Methods		
Lottery Method	Total number of employee	Sample size
1.Project 14 /GoroSilase site	100	70
2. Kolfe /YekaTafosite	40	30
3.Project 13/ Bole Arabsa site	32	20

Source, survey 2022

3.4. Types and Source of data

According to Michael and Jeremy (2016), close-ended questions is useful to respond quickly, this means you can ask more questions on a broader range of topics. Both primary and secondary data were used to conduct the study.

3.4.1. Primary Source

The data consists of materials that gathered by the researcher through systematic observation and the results of questioners. It will collect using questioners. The quantitative data will analyze by using statistical packages for social science (SPSS).

3.4.2. Secondary Source

The data was collected for other purpose and other researcher for their own sake. It is information that the researcher used in the study includes journals, articles and books among others. This data will help the researcher to identify how others have measured key concepts and definitions.

3.5. Data Collection Instrument

The major data collection instrument: that is questionnaires were used by the researcher in order to collect information.

3.5.1. Questionnaire

The questionnaire would have five sections; the first section requests the background data of respondents and the organization. The second section requests the generic sets of factors that contribute to accidents and achieved through literature review and classified the core source of the causes of accidents at the construction projects and three most influential factors such as technical, organizational and human were described. The third section presents specific causes of accidents at construction sites (6 parts): inappropriate state of material (3), job site condition (5), unsafe act (3), unsafe condition (3), work factor and human element (6 questions). The answer selection for this question consists of predetermined answers; yes or no mode. The fourth sections consists of opinion questions about the seriousness of the accidents rate and the types of accidents that happen. And the fifth section represents questions that request for health and safety and environmental training and control factors related to contributing accidents.

3.6. Methods of Data Analysis

The data collect through structured questionnaires were analyzed by using statistical package for social science (SPSS) software. To analyze the data, this research will use both descriptive and inferential statistics techniques. Descriptive statistics was used for the purpose of analyze data which collected from sample respondents and assessed by using statistical tools such as mean, standard deviation, frequency and percentage. Correlation was also used to determine the relationships between explanatory and dependent variables. Furthermore, multiple regressions were generally built around two sets of variable, the dependent variables (occupational accident) and independent variable (unsafe equipment's, management factors, personal factors, unsafe act, unsafe conditions and job site conditions).

3.7. Variable selection and Model specification

a. Independent variable: these are the sets of causes which contribute for occupational accident in construction industries. Such variables are

- Technical (Poor quality of materials or unsafe equipment): representing the technical causes of accident which include the inappropriate state of material factors.
- Organizational cause: representing organizational causes of accident result in job site condition and management factor

➤ Human cause: representing the human causes that increase the amount of accidents in construction projects, which are resulting from unsafe act, unsafe condition and other human elements.

b. Dependent variables

As described above the dependent variable which had values were analysed through multiple linear regression analysis. The multiple linear regression model can be specified as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon$$

Where: Y= occupational accident

- ✓ β_0 = Y-intercept (constant term)
- ✓ X1 = unsafe equipment
- ✓ X2 = work factor
- ✓ X3 = personnel factors
- ✓ X4 = unsafe acts and condition
- ✓ X5 = job site condition
- ✓ ϵ = the model error terms (residuals)

3.8. Reliability and Validity

(Edwin, 2019) define reliability, as the extent to which measurements are repeatable and consistent when different people perform the measurement on different occasion, under different condition, supposedly with alternative instruments which measure the construct and skill. In short, it is stability of measurement in a variety of condition. To increase reliability of the research, the questionnaire was pre tested with 10 respondents. The pre-testing helps to enhance the clearness of the questionnaire. In addition to this, the pilot study was led to find the instruments reliability.

(Edwin, 2019) define validity as the extent to which an instrument measure what are implications to measure and try to explain the truth of research. Validity measures theoretical assessment, this means constructed idea is interpreted or represented in an operational measure. As well, validity measures empirical assessment based on a quantitative analysis involving statistical techniques. To ensure validity the researcher required professional's opinion especially the research advisor and pre-testing was conducted in to certain consumers of the

product, its useful to check questionnaire validity in the context of Ethiopia. Furthermore, the researcher has collected data from reliable sources and conducted the questionnaires from literature review.

Table3. 2.Result of Reliability Analysis for the Questionnaire

$$\alpha = K/K-1(1-(\sum S^2 Y/S^2 Y))$$

VARIABLE	DESCRIPTION	VALUES	INTERNAL CONSISTENCY Acceptable
K	#question sum	59	
$\sum S^2 Y$	sum of question variable	43.13	
$S^2 Y$	variable of total score	145.98	
α	Cronbach's alpha	0.72	

3.9. Ethical Considerations

Before distributing the questionnaires, researcher was provide formal letter for the Lemi Kura sub- city housing development corporation. This study ensures that the information that was provided by respondents is confidential and used only for academic purposes. The respondents have gotten the freedom of not writing their name and were not be pressured to answer the questionnaires without their willingness. As well as, this study will try to avoid misleading statements from the questionnaires.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

4.1. Introduction

This chapter analyzes the results of the collected data from questionnaire and literature review. The first part describes the general information of respondents and the second part contains information about work environment and behavioral factors of the respondents. The third part explains determinants of occupational accident. The fourth part describes the generic sets of causes of accident and the fifth part shows analytical factors contributing accident. The methods of analyzing are by using descriptive. For data representation tables are used to interpret the result. As described in the sample frame of these study 120 randomly selected construction project workers were participated to fulfill the questionnaire. In order to collect the data, 120 structured questionnaires were distributed to the respondents. After that 110 questionnaires were completed and returned and (10) questionnaires were not fulfilled. As a result of this, study was yielding 91.7% response rate.

4.2. Demographic Characteristics of Respondents

As described in table 4.1 below the majority of the respondents were male which accounts 70.9% where as 29.1% of participants were females. This implies that the major satisfaction for the working of construction activity highly dominated by male workers. In case of respondents' age, most of the respondents (65.4%) were in between 21-30 years old. The rest 26.2% and 8.2% of the respondents were 31-40 and above 41 years old respectively. This clearly shows that the majority of the workers were younger. In terms of respondents educational status the majority of them 74.6% of respondents were degree holders and the rest 10%, 8.2% and 7.3% were completed primary diploma and secondary school respectively. This implies that the majority of the respondents relatively have high education status and these were good for the researcher to get necessary information about accidents.

Regarding to job category, the majority (60%) of respondents were construction workers. 26.4% were Forman of the construction projects. The rest, 7.3% and 6.4% of the respondents

were positioned in the fields of mechanical installation and electricity respectively. In line with these, most of the respondents 52.7% have an experience in between 1 and 5 years. Whereas the rest 32.7% and 14.5% of them were experienced in between 6 and 10 years and above 11 years respectively. Meaning that, the majority of the respondents have low experiences. In case of working hour per day more than half of the respondents were working more than 8 hour per day. Whereas (19.1%) of them were work per day less than or equal to 8 hours. This clearly showed that more than 8 hour work per day may prone to risky activity, because their energy and working ability were tried and did not take care / take attention for unexpected suspected accidents.

Table4. 1.Demographic characteristics of respondents

Item	Frequency	Percentage
1. Gender		
Male	78	70.9
Female	32	29.1
2. Age		
21-30 year	72	65.4
31-40 year	29	26.4
>40 year	9	8.2
3. Education		
Primary	11	10
Secondary	8	7.3
Diploma	9	8.2
Degree	79	74.6
4. Position		
Construction worker	66	60
Mechanical installation	8	7.3
Electrician	7	6.3
Forman	29	26.4
5. Experience		
1-5 years	58	52.7
6-10 years	36	32.7
>11 years	16	14.5
6. Hours of work per day		
<8 hour	21	19.1
>8 hour	89	80.9

Source, survey 2022

4.3. Work Environment and Behavioral Factors of the Respondents

According to different literature, the problem of occupational accident involving construction projects workers occurs in many countries. As such the creation of good working environment and disciplined behaviors of workers were mandatory to minimize the accident. So that, those analysis of work environment and behavioral factors was necessary to know the setting of the sampled population.

As described table 4.2, the majority (63.6%) of the respondents were not given health and safety training in their project area. Whereas only the small numbers (36.4%) have little training of safety. This implies that the majority of employees of construction project were not give attention for accident protection mechanisms. As a result of these, more occupational accident was highly experiences in the industry than the other. According to the participants' response, more than half of (79.1%) of them have considerable job satisfaction. However, 20.9% of the respondent replied that they have less satisfaction for the construction work. Their reason was the prevalence or occurrence of accidents in the construction sector than the other industry and they shift or turn over from the working area by forcing the accidents.

Regarding awareness of occupational risks, the majority (93.6%) of the respondents have an awareness of occupational risks. Whereas, a small number of them, 6.4% were not having the awareness of occupational risks. However, to protect against such accidents only low numbers (44.5%) used personal protective devices. Whereas more than half (55.5%) of the respondent were not totally used personal protective devices. The respondents were requested their reason for not using personal protective devices, and the majority (90%) of the respondent replied that not provided or not prepared by construction managers during working time. On the other hand, 10% of the respondents answered that the unavailability of a personal protective device for work was their main reason for not using a personal protective device. This clearly shows that either by employers' reasons or the workers themselves attitudes were no use accident protective devices in construction working areas. In case this situation aggravated the prevalence of occupational accidents in construction projects.

Table4. 2.Work environment and behavioral factors

Variables	Frequency	Percentage
1 Health and safety training		
Yes	40	36.4
No	70	63.6
2 Job satisfaction		
Yes	87	79.1
No	23	20.9
3 Using personal protective device		
Yes	49	44.5
No	61	55.5
4 Awareness of occupational risk		
Yes	103	93.6
No	7	6.4
5 Reasons not using personal protective device		
Not provided	99	90
Unsuitable for work	11	10

Source, survey 2022

4.4. Types of Major Cause and Seriousness of occupational Accident

This section describes respondents' opinion about the seriousness of accident and the types of accident exist or frequently occurred in construction sites. Therefore, the respondents were asked about the existence of accident in Construction Company. As a result the majorities (77.3%) of respondents were replied yes and it implies that there was prevalence of occupational accident in construction industry. As the same time table 4.3 below indicated that 44.5% of respondents said that construction accidents are serious in Addis Ababa Lemi Kura sub-city. The rest 30% and 25.5% of respondents replied fatal and milled respectively. It can be conclude that most of the respondents replied that accidents in construction sites are serious and fatal, indicating greater awareness among site personnel that accidents are not light to be taken too and have a devastating effect on construction project.

In addition to this, table 4.3 showed the respondents view on the types of accident that are exited in construction sites. The result show that falls (48.1%) and falling objects (38.2%) are the top and the most common types of accident in construction sites. This could be attributing to

poor fall protection and poor work method for example failure to secure materials during lifting. So that in these findings connected with various literatures which indicate that falling are the major types of accidents in Addis Ababa, Lemi Kura sub-city construction projects. Other types of accident which received 6.4% of the respondents' agreement were exposed to harmful materials. The rest 3.6% of respondents were exposed to electricity. These types of accident are attributing to incorrect usage of electric sockets, damage installation of electric wires and faulty electric tools. Over exertion are the five types of accident (3.6%). Moreover, the accident nature analysis result indicated that the percentage of accidents which lead to death and amputation were 56.4% and 17.3% respectively. Whereas low numbers of accidents were leads to cut and crush were 16.4%, 10% respectively. Regarding to the effects of accidents (injuries comes from accidents) were crushing and wound which resulted 45.5% and 30% respectively. While injuries like poisoning and fracture were accounted 17.2% and 7.3% respectively.

Beside to this, respondents replied that the responsible agent for the occurrence of accidents were general device and tools which accounts for 43.6% and 24.5% respectively. The types of machinery also contribute a little bit as an agent and counts 20.9%.

Table4. 3.Types of Major Cause and Seriousness of occupational Accident.

Item	Frequency	Percentag
Is there occupational accident in nstruction company		
Yes	85	77.3
No	25	22.7
1 Seriousness of accidents		
Milled	28	25.5
Serious	49	44.5
Fatal	33	30
2 Types of cause of occupational accident quently occurred at construction site		
Fall victims	53	48.1
Struck by failing objects	42	38.2
Contact harmful materials	7	6.4

Over exertion	4	3.6
Contact to electricity	4	3.6
3 Nature of accidents		
Death	62	56.4
Amputation	19	17.3
Crush	11	10
Cut	18	16.4
5. Agents for frequent occurrence of accident		
Substance	12	10.9
Tools	27	24.5
Machinery	23	20.9
Device	48	43.6

4.5. Classification of Major Cause of Occupational Accident

The data's was collected through well-structured Liker scale questionnaire and it analysed by using statistical package for social science (SPSS) software. To determine the minimum and the maximum length of the 5-point Likert type scale, the range is calculated by $(5 - 1 = 4)$ then divided by five as it is the greatest value of the scale $(4 \div 5 = 0.80)$. Afterwards, number one which is the least value in the scale was added in order to identify the maximum of this cell. The length of the cells is determined below (Dawes, 2009):

- From 1 to 1.80 represents (strongly disagree).
- From 1.81 until 2.60 represents (do not agree).
- From 2.61 until 3.40 represents (true to some extent).
- From 3.41 until 4.20 represents (agree).
- From 4.21 until 5.00 represents (strongly agree).

To analysed the data, this research was used both descriptive and inferential statistics techniques. Descriptive statistics was used for the purpose of analyse data which collected from sample respondents and assessed by using statistical tools such as mean, standard deviation, frequency and percentage. The researcher was investigated causes of accident in construction site in Addis Ababa Lemi Kura sub-city, categorized by relating it to three major group, and watch by detail. Table 4.4 represents the cardinality occurrence of individually identified

(technical, organizational and human) cause of occupational accident and they ordered from maximum to minimum mean value. In cumulative percentage share of subsequent causes, the table identified causes as significance, minor and irrelevant causes of accident in construction project. As shown in the table 4.4 below a total of five technical causes was identified to analyze the groups of accident. The causes identified with the greatest important for the assurance of occupational accident safety. They represent the greatest percentage of technical causes with high value of mean such as lack of adequate protective device, lack of incorrect signal hazards, failure to meet the Required technical parameter, lack of adequate measure of collective protection and lack of quality of construction materials have mean value 4.35, 4.25, 4.03, 4.02, and 3.48 respectively. This implies that the majority of the respondents were agree for the major causes of technical causes which responsible for the occurrence of occupational accidents in construction company. Therefore the average mean value of technical cause of accident was 4.02.

Also the table shows that the counting occurrence of the identified organizational causes which ordered from maximum to minimum. From the highest percentage share of subsequent causes, a total of five organizational causes are identified in the analyzed accident causes. Of all identified organizational causes, improper selection of personal protective device, lack of supervision and poor site managements have the highest mean value which counts 4.13, 4.12 and 4.05 respectively. The fourth significant cause of organization was inadequate professional training of employee (3.92). this also implies that the majority of the respondents were agree about the organization cause which aggravated accidents in construction projects and the average mean value the identified causes was 3.97. Moreover, the table shows the cordiality occurrence of the identified human causes which order from maximum to minimum mean value. From high mean value of subsequent causes, the most significant are failure to use personal protective device (4.18), ignorance rules and regulations 4.05), improper plan of work (3.99) and sudden illness (3.65), consumption of alcohol and drag (3.33). Therefore the majority of respondents were strongly agreed about the human causes that precede accidents in Construction Company and the average value of the cause was 3.84.

According to the response of the respondents in table 4.4, the generic sets of causes of occupational accident on average mainly attributed to technical cause (4.02) are lack of personal

protective device, lack of quality of construction materials and incorrect signal of hazards. The second major generic causes is due to organizational factors (3.92) which comprises lack of supervision; poor site managements and improper selection of personal protective device contribute to the outcome of accident. The third major cause was human factors (3.84) which related to failure to use personal protective device, ignorance rules and regulations and improper plan of work. From the above description someone inferred that the cause of occupational accident was assumed as deficiencies and irregularity related to employee and their abnormal behavior, material factor and general organization of work. The sets of causes of occupation accidents are the results of three types of generic causes, such as technical, organizational and human. Therefore, all causes of occupational accidents are the sum of technical, organizational and human cause and in each of these sets several or more specified causes are described. In this research the main generic sets of cause of occupational accidents are technical followed by organizational and human respectively and their contribution nearly equal to generate cause of occupational accidents in construction project. So that on average the most generic causes of occupational accidents are technical, organizational and human were mainly identified by the respondents.

Table4. 4. Generic set of cause

Technical cause	Strongly Agree	Agree	neutral	disagree	strongly disagree	Mean	SD
inadequate protective devise	67(60.9)	28(25.5)	5(4.5)	6(5.5)	4(3.6)	4.35	1.044
Lack of collective protection	38(34.5)	52(47.5)	6(5.5)	12(10.9)	2(1.8)	4.02	1.004
Lack of signal of hazards	49(44.5)	47(42.7)	5(5.5)	7(6.4)	1(9)	4.24	.888
Lack of technical parameter	36(32.7)	57(51.8)	6(5.5)	6(5.5)	5(4.5)	4.03	1.009
Lack of qualities of materials	31(28.2)	28(25.5)	22(20)	21(19.1)	8(7.3)	3.48	1.002
Organizational cause							
Lack of supervision	38(34.5)	53(48.2)	13(11.8)	6(5.5)		4.12	.821
Poor site management	33(30)	61(55.5)	9(8.2)	3(2.7)	4(3.6)	4.05	.907
Improper selection of PPE	47(42.7)	39(35.5)	15(13.6)	9(8.2)		4.13	.940
Incorrect job sharing	27(24.5)	41(37.3)	19(17.3)	21(19.1)	2(1.8)	3.64	1.107
Inadequate professional training	39(35.5)	44(40)	9(8.2)	15(13.6)	3(2.7)	3.92	1.110
Failure to use PPE by an employee	55(50)	36(32.7)	8(7.3)	6(5.5)	5(4.5)	4.18	1.085

Table4. 4. Generic set of cause

Technical cause	Strongly Agree	Agree	neutral	disagree	strongly disagree	Mean	SD
Consumption of alcohols & drug	25(22.7)	30(27.3)	25(22.7)	16(14.5)	14(12.7)	3.33	1.085
Ignorance of regulations and rules of occupational health and safety	33(30)	61(55.5)	9(8.2)	3(2.7)	4(3.6)	4.05	.907
Sudden illness, Physical fatigue	22(20)	44(40)	32(29.1)	8(7.3)	4(3.6)	3.65	.999
Improper plan of work	29(26.4)	61(55.5)	12(10.9)	6(5.5)	2(1.8)	3.99	.873

4.6. Descriptions and Analysis of Factors Contributing to Accident

The table 4.5 contained the results of factor or cause analysis of accident. The result shows that factors like defective tools and equipment's and inadequate maintenance of equipment were high and accounts to be 90.9% and 70% respectively. The Third highest causes of accidents (55.5%) were due to inadequate handling of equipment's. From job site condition poor site management (75.5) and low level of coordination (51.8%) were responsible for the occurrence of accident in the construction industry .Moreover, the results of unsafe act analysis showed that inadequate position for tasks (89.1%), Failure to accept rules and regulations safety and health (86.4%) and low knowledge (80%) have the most important factors for occupational accident in the construction sites.

On the other hand, the personal factor analysis indicated that Lack of positive effect for corrective behaviour (100%) was the major factor for the occurrence of accident and all respondent were agrees about the statement. Inadequate training and not using PPE, lack of judgment and experience were lead to occupational accident and represent the percentage of (94.5),(79.1%) and(70%) respectively. Furthermore, most accidents were occurred due to work factors such as insufficient planning for work (90%), insufficient instruction and orientation (79.1) and insufficient evaluation of needs and risks (74.5%).

From the above description which inferred that of the basic personal factors most frequently observed by the respondents were lacks of workers training, experience and judgment were the causes of occupational accident. This implies that workers did not have an adequate work speed while they work and they are not aware of the risk that they are exposed to in each activity. Furthermore, the basic work factors that most frequently involved in the occupational

accidents were insufficient planning for work and insufficient evaluation of needs and risks representing the highest cause of accidents which answered by respondents. All and all the percentage share of for occupational accident of personal and work factors to contribute occupational accident were 55% and 45% respectively. Moreover, the basic causes unsafe work act most frequently mentioned and significant on occupational accidents causes were not using personal protective device, inadequate position for the task and making safety instrument inoperable factors were lead occupational accident.

Additionally the immediate cause of unsafe condition in the occupational accident studies was the improper protection equipment representing. Beside to this from the lack of control site condition, poor site managements contribute for significant role for occupational accidents which representing. So that the percentage share of immediate causes of occupational accidents were 85.1% from unsafe acts and condition from unsafe conditions.

Table4. 5.Description and analysis of factors contributing to accident

Variables	Frequency	Percentage
1. Unsafe equipment		
Defective tools and equipment	100	90.9
Inadequate handling of equipment	64	55.5
Inadequate maintenance of equipment	77	70
2. Job site condition		
Poor site management	77	70
Excessive noise	83	75.5
Low level of coordination	43	39.1
Insufficient identification of exposure to loss	37	51.8
3 Unsafe act		
Inadequate position for tasks	98	89.1
Low knowledge	88	80
Failure to accept rules and regulations safety and health	95	86.4
4 Personal factor		
Lack of positive effect for corrective behaviour	110	100
Restricted movement and body weight	21	19.1
Insufficient experience	77	70
Inadequate training and not using PPE	104	94.5
Lack of preparation	61	55.5
Lack of judgment	87	79.1
5. Work factors		
Insufficient planning for work	99	90
Insufficient instruction and orientation	87	79.1
No motivation program	64	58.2

4.7. Correlation Analysis

Using The Pearson's Product Moment Correlation Coefficient (r) the degree of association between the independent variables (unsafe equipment, management or work factors, personal factors, unsafe act and condition, and job site conditions) and the dependent variable (occupational accident) were computed to determine the strength, direction and statistical significance of the relationships as shown in table below. Correlation analysis is useful way of exploiting relation (association) among variables. The value of the coefficient (r) ranges from -1 up to +1. The value of coefficient of correlation (r) indicates both the strength and direction of the relationship. If $r = -1$ there is perfectly negative relationship between the variable. If $r = 0$ there is no relationship between the variable and if $r = +1$ there is perfectly positive relationship between the variables. For values of r between +1 and 0 or between 0 and -1, different scholars have proposed different interpretation with slight difference. For this study diction rule given by Bartz (1999) was used to describe the strength of association among the variables as follows.

Table4. 6. Interpretation of r value

Value of r	Description
0.80 or higher	very high
0.6 to 0.8	Strong
0.4 to 0.6	Moderate
0.2 to 0.4	Low
0.20 or low	very low

Source: Bartz (1999)

Depending on this assumption, all basic constructs were included into the correlation analysis. Figures with the symbol “***” indicate that each of the variables are significantly correlated with each other at a significance level of $p < 0.05$.

Table4. 7.Correlations of variable

		unsafe equipment's	site condition	unsafe act and condition	personal factor	work factor	occupational accident
unsafe equipment's	Pearson relation Sig. (2-tailed)	1	.572** .000	.659** .000	.898** .000	.910** .000	.866** .000
site condition	Pearson relation Sig. (2-tailed)	.572** .000	1	.377** .000	.637** .000	.521** .000	.495** .000
unsafe act and condition	Pearson relation Sig. (2-tailed)	.659** .000	.377** .000	1	.592** .000	.723** .000	.761** .000
personal factor	Pearson relation Sig. (2-tailed)	.898** .000	.637** .000	.592** .000	1	.818** .000	.778** .000
work factor	Pearson relation Sig. (2-tailed)	.910** .000	.521** .000	.723** .000	.818** .000	1	.951** .000
occupational accident	Pearson relation Sig. (2-tailed)	.866** .000	.495** .000	.761** .000	.778** .000	.951** .000	1

** . Correlation is significant at the 0.01 level (2-tailed).

As it can be seen in the above table 4.7, unsafe equipment and accidents i.e. ($r=0.866$, $p<0.01$) there exist a positive strong and statistically significant relationship in between them. It can be also observed that, there exist a positive and statistically significant relationship between site condition and occupational accidents ($r=0.495$, $p<0.01$), similarly there exist a positive and statistically significant relationship between unsafe acts and occupational accidents($r=0.761$, $p<0.01$). Concerning to the relation between personal factors and occupational accidents, the result shows that positive and statistically significant relationship between them i.e. ($r=0.778$, $p<0.01$). Again there are a positive and statistically significant relationship between work factors and accidents($r=0.951$, $p<0.01$). Moreover the most correlated variable was work factors($r=0.951$) followed by unsafe equipment's ($r=0.866$), and the third was personal factors ($r=0.778$). The rest unsafe condition and site condition have r value 0.761 and 0.495 respectively.

4.8. Test for Variable

4.8.1. Multicollinearity Test

Multicollinearity is a problem that occurs with regression analysis when there is a high correlation of at least one independent variable with a combination of the other independent variables. As variables are highly correlated in a multiple regression analysis, it is difficult to identify the unique contribution of each variable in predicting the dependent variable because the highly correlated variables are predicting the same variance in the dependent variable. Multicollinearity exists when Tolerance is close to zero and the standard error of the regression to be high. More over the Egan value of the predictor close to zero and the value of the condition set greater than 15 indicate the high Multicollinearity between the explanatory variables. Another statistic sometimes used for Multicollinearity is the Variance Inflation Factor, which is just the reciprocal of the tolerance statistics. A VIF of greater than 0.1 is generally considered evidence of no Multicollinearity. Therefore, except unsafe equipment, there is no Multicollinearity between site condition, unsafe act and condition, personal and work factors because there tolerance is >0.1 and VIF is less than 10.

Table4. 8.Multicollinearity Test

	Tolerance	VIF
unsafe ipment	.100	10.019
site condition	.595	1.682
unsafe act and dition	.477	2.098
personal factor	.171	5.853
work factor	.144	6.945

4.8.2. Linearity and Normality

The other test that the assumption can be checked is inspecting the linear relationship between dependent and independent variables. Therefore as it could in traduced under the model selection topics of chapters three the model is linear because the increase of explanatory variable by 1 unit leads the increments of dependent variable by the coefficients of explanatory variables. Furthermore the study testes normality of the error term, residual is the difference between the observed and model predicted value of the dependent variables. Histogram of the residual will help to check the assumption of normality. The shape of the histogram should approximately follow the shape of the normal curve and the following histogram is accepted close to normal curve.

Histogram

Dependent Variable: occupational accident

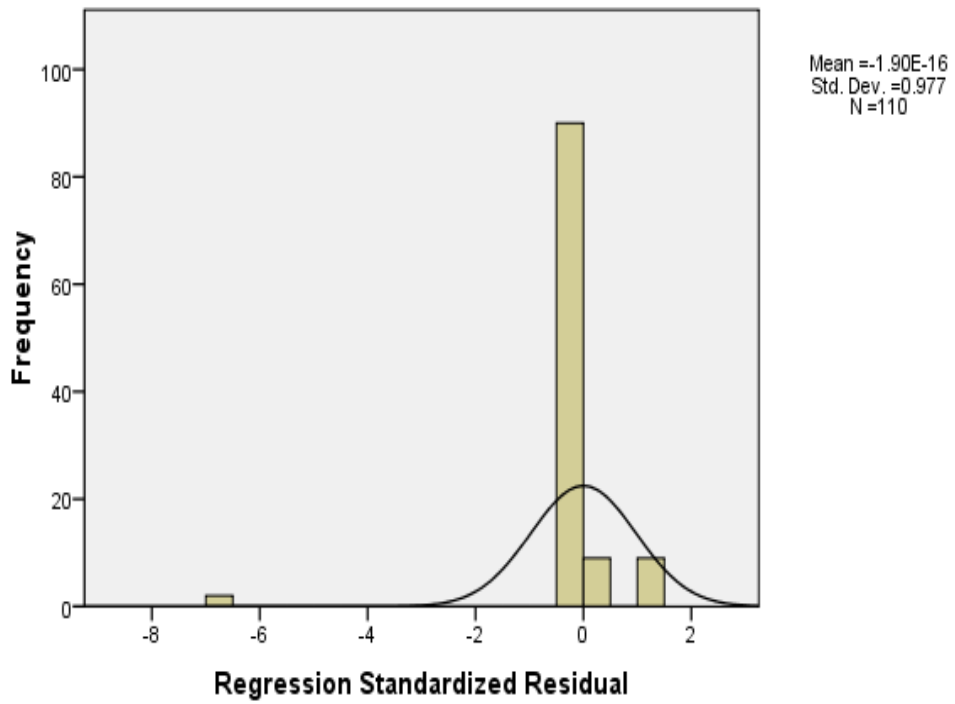


Figure4. 1: Normality

4.9. Regression Analysis

The multiple regression analysis is an analysis of association in which the effects of two or more independent variables on a single, interval scaled dependent variable are investigated simultaneously. The results of this analysis indicate how well a set of variables is able to predict the dependent variable. Furthermore, it shows how much unique variance in the dependent variable is explained by each of independent variables.

In order to test the causes of occupational accident, the multiple linear regression analysis was utilized. Table 4.9 presents the results of multiple linear regressions of variables. In the model, the determinant factors together were entered and the main effects of the variables were assessed. The output is comprised of beta, t-value, the R Square, Adjusted R Square change, F statistics and the significance value (*P*-value). Therefore the model summary of the result show that the coefficient of correlation of 0.957 which implies that there were strong positive relationship between dependent and independent variables. More over the coefficient determination value was 0.915 implies that 91.5% of the change of occupational accident by independent variables. The remaining 8.5% of the variance of dependent variable can be explained by other variables.

Table4. 9. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.957 ^a	.915	.911	.125

a. Predictors: (Constant), work factor, site condition, unsafe act
condition, personal factor, unsafe equipment's

b. Dependent Variable: occupational accident

Moreover the overall usefulness of the regression model was evaluated. As a result the F ratio describes whether the results of the regression model could have occurred by chance. Large F value and small significant level $P < 0.05$ or 0.01 indicated that the result probably are not due to random chances. Accordingly, as it can be seen from the table below the F

value is $F = 224.756$ and is significant at 0.000. Hence the researcher can suggest that, the regression model adopted in this study has not occurred by chance and is considered significant at 5% level and 95% confidence interval level are explaining the relationships that exist between variables.

Table4. 10. ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	17.682	5	3.536	224.756	.000 ^a
	Residual	1.636	104	.016		
	Total	19.318	109			

a. Predictors: (Constant), work factor, site condition, unsafe act and condition, personal factor, unsafe equipment's

b. Dependent Variable: occupational accident

The below Table 4.11 evaluates and interprets the standardized coefficients of correlation (beta). In estimating the contribution of each independent variable in the study, it was established that all independent variables significantly contributed in variance of the occupational accident at significance level of 0.05. However, the relative importance of each independent variable was different. Also, since the significance values are less than 0.05 all coefficients are significant.

The result indicated that work factor has the strongest influence on the occurrence of occupational accident with the highest beta value 0.840. The beta value on the coefficient table indicates level of effect each variable has on the dependent variable. This means that for every additional point or value in the work related factors one could predict 0.840 points on the prevalence of occupational accident provided that other variables being constant or in other word 84% variation in accident is caused by work related problems which is significant at 0.000. Therefore, the study concluded that work factor positively and significantly affected the presence of accident in construction project.

Site condition was positively related to accident with $\beta=0.540$ ($\alpha<.01$). Therefore support was found to indicate that site condition has an influence the occupational accidents of construction project. It therefore implied that the bad site condition, the more prevalence of accident. Therefore, the result shows that statistically significance positive relationship between improper site condition and occupational accident at 1% significance level. When the site condition problem increases by 1 unit, accidents in construction site increased by 0.540 units if the other variables remain unchanged. This implies that site condition positively affects the occurrence of accident in Construction Company.

Unsafe equipment's were positively related to occupational accident with $\beta = 0.340$ ($\alpha<.05$). This evidence indicates that unsafe equipment's have an influence on the prevalence of occupational accidents. It therefore implied that the more unsafe equipment's, the more prevalence of accidents. Personal factors or human errors was positively related to occupational accident systems with $\beta=0.510$ ($\alpha<.05$). Therefore support was found to indicate that human errors have an influence on the prevalence of accidents in construction industry. It therefore implied that faulty practices of human beings aggravated the existence of accidents in construction projects. Unsafe acts and conditions were also positively related to prevalence of accidents with $\beta = 0.153$ ($\alpha<.05$). Support was therefore found to indicate that unsafe conditions have an influence on the occurrence of accidents.

The predictive model developed was:

$$(OCA)=Y=0.016+ 0.340(UE) + 0.540(SC) +0.153(UC) + 0.510(PF) +0.840(WF)$$

Where, Y = occupational accident (OCA), UE=Unsafe equipment's, SI=Site condition, UC=Unsafe condition, PF= Personal factors, WF= Work factors

Table4. 11.Coefficient's

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	.016	.047		0.34	.0078
unsafe equipment's	.476	.084	.340	5.666	.000
site condition	.601	.031	.510	9.709	.000
unsafe act and condition	.282	.049	.153	3.714	.000
personal factor	.808	.062	.510	8.193	.000
work factor	.818	.073	.840	11.205	.000

4.10. Discussion of the Result

The findings of this study showed that construction accidents were a combination of different factors. These factors consisted of individual, organizational, and technical factors in special causes. The findings of this study and some other studies have shown that the construction industry and its related sites are dangerous and high risk environments, the consequence of which can lead to adverse and catastrophic accidents. Therefore, identifying and analyzing factors can assist in the identification of hazards and risks of a project. It can also reduce the rate of accidents and occupational damage on a construction site.

The study found that the majority of building construction companies were not given health and safety training and they were not given attention for accident protection mechanisms. As a result, more accidents were highly experienced in the construction industry than elsewhere. Furthermore, the study found that most of the construction employees were well aware of occupational risk. However, to protect such risks only small numbers of employees were using personal protective devices. Their reason for not using personal protective devices was the unavailability of personal protective devices. So that either by employer reason or workers' attitude were not used personal protective devices.

The study also found that a construction accident in Addis Ababa, located in Lemi Kura Sub-city, was fatal and serious. In line with this, the top three types of accidents were frequently occurred in the construction projects of Addis Ababa Lemi Kura sub-city. These were falling,

falling objects and caught between objects. And the nature of accident highly characterized by death and amputation. Which were highly come from the responsible agents of tools and general devices.

Regarding to the classification of causes of accidents, all causes grouped in to technical organizational and human factors. As such the study found that more causes of accidents were catalyzed by technical factors followed by organizational and human as well as causes of in particular groups; therefore according to the respondents, in the groups of technical cause, lack of adequate protective device and lack of quality of construction materials. In the groups of organizational causes the first and foremost was lack of direct supervision by construction managers and in group of human cause failure to use personal protective device by employee were aggravated the occurrence of accidents in construction industry.

Concerning to the main causes of accident the study showed that effective factors of occupational accidents are related to unsafe act and condition (85.1%) ,work factors (75.45%) ,unsafe equipment(72.1%)and workers and work teams (personal factors 69.7%). The important role of individual and organizational variables in the construction project compared with other industry is due to worker themselves being responsible for their own and organizational safety.

As accident type analysis showed that almost all kinds of accidents possible (falling, throwing objects, crush.) have occurred. According to respondents reports the highest number of accidents was due to falling and falling objects and they have an important role in occupational accidents. Furthermore, the result of work factors analysis proved that insufficient instructions and orientations including insufficient evaluation of needs and risks have the most important role in occupation accidents in construction industry thus statically analysis have proved that there is significant relationship between accident frequency.

In line with, the model identified major causes of construction accidents; such causes were high working hours, low safety and health training. Devise (tools), low health and safety training and control, not using PPE (personal protective device, insufficient experience, lack of judgments, and insufficient evaluation of needs and risks and no motivational programs.

The correlation result shows that all factors of accidents have a positive and significant effect on the prevalence of occupational accident. Moreover the most correlated variable was

the work related factor ($r=.951$) followed by unsafe equipment's ($r=0.866$), and the third was personal factors ($r=0.778$).

The effects of variables in combined had strong relationship on occupational accident shown by coefficients of correlation 0.957. The R-square obtained of 0.915 implies that explanatory variables describe up to 91.5% the change of the prevalence of accidents. The regression model was also significant at 95% confidence level in explaining the relationship that exist between the study variables i.e. the model was reliable. Moreover individually, all explanatory variables were significant and positive association and they can be used in predicting the change of occupational accidents.

CHAPTER FIVE

5. CONCLUTIONS AND RECOMMENDATIONS

These chapter summaries the outcome of the research and presents notable conclusions and recommendations which could help all parties involves in building construction project to improve and develop their own practice of managing occupation accidents. Some of the recommendation for other further studies is presented.

Generally speaking, the objective have been achieved, some results were concluded, and recommendations are hoped to improve the capability of health and safety, one hand, and to add a value for construction researcher, in the other hand.

5.1. Conclusions

Generally, the prediction of building construction products is a risky, complex and lengthy process. The total development of construction project normally consists of several phase requires a diverse range of specialized service. Cost, time, quality and safety are important characteristics of every project. For the construction industry in Ethiopia there has been lack of safety requirement has led to increase expose of workmen and the general public to risky situation at construction sites resulting high chance of occurrence of accidents. Accidents could result is not only direct physical injury to person or damage property, but also short and long term effect to the economy and society

- Regarding the generic set of occupational accident the researcher concluded that, the average mean value for technical cause is 4.02, organizational cause 3.97 and human cause 3.84 this mean the respondent is agree for the Major cause listed. All causes of occupational accidents are the sum of technical, organizational and human cause and in each of these sets several or more specified causes are described. In this research the main generic sets of cause of occupational accidents are technical followed by organizational and human respectively and their contribution nearly equal to generate cause of occupational accidents in building construction project. So that on average the most generic causes of occupational accidents are technical, organizational and human had more influence.

- Regarding the relationship between independent variable (unsafe equipment, unsafe act and condition, personal factor and work factor)) are positively and significantly related to dependent variable (occupational accident) as this independent variable changes directly influence on their occupational accident. The study concluded that unsafe equipment 0.866, unsafe act and condition 0.761, personal factor 0.778 and work factor 0.951. Therefore there is very high correlation or relationship between basic factors and occupational accident (independent and dependent variables).

Regarding the effects of basic factors on occupational accident, the results of regression model indicates that 91.5 % of variance that explained occupational accident in terms of basic factors. The model summary presents how much of the variance in the dependent variable is explained by the model. Moreover coefficients of the predictor variables are statistically positive and significant at less than five percent indicating that there is a significant and positive effect of basic factors on occupational accident in building Construction Company.

5.2. Recommendations

Based on the research findings and sub-sequent discussion the researcher recommended as follow

- Lemi Kura sub-city public building construction companies create and standardize the analysis and work process, particularly critical task which can be identified with an appropriate risk evaluation and control. In addition management commitment is essential to establish clear policy regarding health and safety and so as to supply the necessary resource for its limitations.

- Planning is considered to be fundamental step that organization should conduct to prevent occupational accident, all essential information should be collected in a clear and detailed document, so as to implement systematic and effective preventive action, to confront the occupation risk.

- Engage competent professional and ensure close site supervision, promote professionals and even complain with the professional cord of ethics. Undertake insurance covers and consider health and safety at all stages of project implementation.

- Moreover, the concern of building construction project and the responsible body should be maintain and regularly service tools, plants and equipment and ensured good site

organization, provide proper personal protective equipment, hire qualified and Enough workers and conduct safety inspection .

5.3 Recommendations for the further study

This study was conducted only on one sub-city building Construction in Addis Ababa and other researchers might rather consider either all private building or road construction other than Addis Ababa. This research approached only used quantitative methods and other researcher might be used mixed approach to find triangulation source of data. This research considered three variables that affect occupational accident of building construction project. Future researchers can investigate other variables that might affect success of construction project.

REFERENCE

- Adan E., (2016). Factor affecting safety of construction project.
- Abdlhamid T.S.,Everate, J.G.,(2011). "Identifying the root causes of construction accident"
Journal of construction engineering and management vol-121: p52-60.
- Akhtar, I. (2016). 'Research design', *Research in Social Science: Interdisciplinary Perspectives*, pp. 68-84.
- Baradan, S., Usmen, M., (2012). Compensative injury and fatality risk analysis of building trades.
- Bon R, Crothwaize, D., (2000). The further of international construction.
- Boru, T. (2018). Research design and methodology'. *University of South Africa*.
- Chang, C.W, Leuss, lincc, Fane, (2010). Characteristics analysis of occupational accident at small construction enterprise.
- Chi, C, Chang, T and Ting, H, (2005). Accident patterns and prevention measures for fatal occupational falls in the construction industry, *Applied Ergonomics*, 391-00
- CM-Tam, S.X.,Zeng.Z.M.Deng, (2011). Identifying elements of poor construction safety Management in China pp 569-589.
- Devause .K (2002), statistical formula for research.
- Edwin, K. (2019). 'Reliability and validity of research instruments' Correspondence to kubaiedwin@yahoo.com. NMK Conference, pp. 1-9.
- Fung, I.W.H., Tam, V.W.Y, L.O, J.Y and L.U, L..L.H., (2009). Developing a risk assessment model for construction safety: *international journal of project management* 28(6), 593-00.
- Gangoellis, M, Casals, M, Forcada, N, Roca, X and Fuertes A.,(2010). Mitigating construction safety risks using prevention: *journal of safety research* 107-122.

Goh,K.C., H.H.,Goh., M.F., Omar, T.C., Joh,A.A.M., Zin, (2016). Accident preventive practice for high rise construction in MATEL web of conference 47 EDPR Science.

Hair, J., Black, W., Babin, B., Anderson, R. & Tatham, R. (2006) *Multivariate data Analysis*. 6th edn. Upper saddle River, N. J.: Pearson Prentice Hall

Hinze, J and Applagate L., (2010). Cost of construction injuries, Journal of construction engineering and management.

Hinze, J. L., (2010). Construction safety. New Jersey.

Hinze J., DevenportJN,Giang G., (2005) Analysis of construction worker injuries result a lot of time.

Hughes, P. and Ferret.E., (2007). Introduction to health and safety in construction, 2nded

I.M H.J, Kwon, Y.S, KIM S.G, KIM Y.K., (2009). The characteristics of total occupational injuries in Korean construction.

International labor organization (I.L.O), (2010). Prevenion. A global strategy promoting safety and health at work. The ILO report for world day of safety and health at work, international labor office Gahanna.

Jha, K.N., (2011) Construction project management: theory and practice. Dorling Kindersley (India). Pvt.Ltd. Licenses of person Education in South Asia.

Kartam.N A.L Flood.P.Koushki, (2009). Construction safety in Kuwait procedure, problems and recommendation.

Lopez,etValcarcal A., (2011).Occupational safety and health in the construction work.

Lubrga.H., (2000) An investigation in to the cause of accident in the construction industry Uganda PP103-104.

Mbuya, E. A., (2014).Towards development of a framework for integration of safety and quality management techniques in construction project delivery system. International journal of

quality. Michael R. H. and Jeremy J. S. (2016) 'Open- versus close-ended survey questions'. *NM State University*, pp. 1-5.

MoFED, (2014) Estimates of GDP and other Macroeconomic indicators – Ethiopia. [Online].

<http://www.mofed.gov.et/GDP>. [Accessed 31 December 2016]. Ministry of Finance and Economic Development, Addis Ababa

Mol.T., (2003). *Productive safety management*". Butterworth-Heinemann, Elsevier.

Molla M, Alemu K, (2016). Occupational injuries among building construction workers

Nawrot T., (2006). About failures and catastrophes in the construction industry *Inzynieria: Budownic two*, Y.62, no 12. pp656-657,.

Petersen, D. (1982). *Human Error- Reduction and safety management*, STPM press' New York.

Philip, E, Hajgan, P.E., Montgomery. J.F. O'Reilly J.J., (2011). *Accident prevention manual for business and industry administration and programs*. 12th edition

Pipitsu.T.Paphol, T.Watanaba, (2010). Identification of root causes of labor accident in Thailand construction industry p193-202

Raczkowski, B..OHS, (2005). *In practice, center of consulting and personal development in construction industry*

Stephien T, *Czasopismo, Techniczne*, (2008). Identification of factors severing accident rate in construction industry.

Tam C.M, Zeng S.X and Deng Z.M., (2004). Identifying elements of poor construction safety management in safety science.

Taylor, G, Easter, K. and Hegney, R., (2004). *Enhancing occupational safety and health*. Elsevier Butterworth-Heine Mann.

WubishetJekale (2004). *Performances for public construction projects in developing Countries: Federal road and building projects in Ethiopia*.

APPENDIX1-RESEARCH QUESTIONNAIRE

Addis College

Construction Technology and Management

(QUESTIONNAIRE)

Identifying Major causes of occupational accident in Construction Company: in the case of Lemi Kura sub city.

This piece of research is aimed at **investigating the Major causes of occupational accident in Construction Company**. Your genuine responses to the following questions are of paramount importance to the success of the investigation. So, I would like to kindly ask you to respond to the questions by reading the instructions given for each section. Participation in responding the questionnaire is entirely voluntarily and there is no risk associated with it.

For unclear questions (if any) use the following addresses.

Sincerely

Address: Mob. No. - 0921-7739- 22

E-mail – Redietsheferaw0@Gmail. Com

August 2022

Section 1: Socio economic characteristics of the respondent and organizational Data

Please complete this section by taking appropriate box

1 sex: Female

Male

2 Age: <20 years

31-40 years

21-30ears

>41 years

3). educational statuses

Primary school

Diploma

Secondary school

Degree

4). working section (job category)

Construction worker

Electricity

Mechanical installation

Forman

5). experience

1-5 years

11 years

6-10 years

6). hours of work in a week

<48 hrs.

>48 hrs.

7).is there any health and safety training?

Yes

No

8). job satisfaction

Yes

No

9). using personal protective equipment (PPE)

Yes

No

10 Awareness on occupational Accident

Yes

No

11 Reason not using personal protective equipment

Not provide

Unsuitable for work

Section 2: Generic sets of Causes of Accident

Generic source	Specific cause	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
Technical causes	1 Lack of or inadequate protective device					
	2 Lack of or adequate measure of collective protection					
	3 Lack of or incorrect signal of hazards					
	4 Failure to meet the required technical parameters					
	5 Lack of qualities of construction materials					
Organizational cause	1 Lack of supervision					
	2 Poor site management					
	3 Acceptance of deviation from the rules and regulations of health and safety in proper selection of personal protective device					
	4 Incorrect job sharing or task schedule					
	5 Inadequate professional training of an employee					
Human cause	1 Failure to use personal protective equipment by an employee					
	2 Consumption of alcohols, drug or psychotropic substances					
	3 Ignorance of hazards regulations and rules of occupational health and safety					
	4 Sudden illness, Physical deterioration fatigue					
	5 Improper plan of work					

Section 3: The Major Basic and Immediate Causes of Construction Accident

No	Factor of accident	Basic and immediate cause	Respon
1	Unsafe equipment	1.defective tools ,equipment or materials	Yes
			No
		2.inadequate handling of equipment	Yes
			No
		3.inadequate mentainance of equipment	Yes
			No
2	Unsafe act	1.not using personal protective device	Yes
			No
		2.indequate position and for the task	Yes
			No
		3.inadequate load	Yes
			No
		4.making safety instrument inoperable	Yes
			No
3	Unsafe condition	1.improper protection	Yes
			No
		2.inadequate warning system	Yes
			No
		3.disorder	Yes
			No
4	Personal factor	1.lack of positive effort for corrective behavior	Yes
			No
		2.restricted movement	Yes
			No
		3.insufficiant experience	Yes
			No
		4.inadequate initial training	Yes
			No
5.lack of preparation	Yes		
	No		
6.lack of judgment	Yes		
	No		
5	Work factor	1.insufficaint planning of work	Yes
			No
		2.insufficaint instruction and orientation	Yes
			No
		3.insufficaint evaluation of need and risk	Yes
			No

		1. no motivation program	Yes
		2..poor site management	No
6	Job site condition		Yes
			No
		3..excessive noise	Yes
			No
		4.low level of coordination	Yes
			No
		5.insufficaint identification of exposure to loss	Yes
			No

Section 4: Determinants of Occupational Accident

1).your level of agreement on the severity of accident rate at your construction sites

Milled Fatal
 Serious

2). nature of accidents faced in construction site

Death Crush
 Amputation Cut

3 Type of accidents that are commonly occurred in construction site

- Falls
- Struck by falling objects
- Caught between objects
- Over-exertion
- Exposed to contact with extreme electric current
- Exposed to contact with extreme harmful materials
- Others

4).Agents causing the frequent occurrence of accident in construction sites

Materials or substances Tools and utensils
 Machinery or equipment Devices

5. Types of injuries caused by accidents in construction sites

Crushing Wound Fracture
 Tear effects of electricity Poising

6).In your experience which days of week mostly accident occurs

Monday

Thursday

Saturday

Tuesday

Friday

Wednesday

Section 5: Factures related to Safety and Health

1. in your experience when health and safety environment (HSE) training held on

Pre-employment training

Training after accident

Periodic training

If you agree on the practice of training how long (duration of training and suitability of the content to the trainees -----

2. What are health and safety environment (HSE) control measures in your company?

Awareness of personal protective equipment

Control measures such as personal protective equipment

Health and safety equipment inspection and audit

Tool box meeting