AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN MOTIVATION AND UNSAFE BEHAVIOUR ON CONSTRUCTION SITES

By

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DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma at the Kwame Nkrumah University of Science and Technology, Kumasi or other educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

The Construction industry plays an important role in the attainment of socio-economic policies and seen as a major driver of development especially in developing economies. Construction workers bring their belief, value and vision to the compliance to safety management systems and ultimately to the performance of work. The raise of industrialization globally brought along concerns of occupational hazards and diseases due to new complexities of construction as well as large employment of human resources in the industry. Some researchers have associated this problem with poor motivational levels. The aim of this study was to establish empirically the relationship between motivation and unsafe behaviour of the construction worker by fulfilling the following objectives; determine critical motivation factors, determine frequently occurring unsafe behaviour and determine impact of motivation on unsafe behaviour. Using a questionnaire survey approach, Ghanaian local (D1/K1 and D2/K2) contractors were selected using purposive and convenience sampling techniques. Fifty responses were retrieved, SPSS v.23 was used to process and analyse the first two objectives in frequency tables, mean score, standard deviation and percentages. The study employed partial least square structural equation modelling (PLS-SEM) to estimate the relationship between motivation and unsafe behaviour on construction sites. The study discovered that, construction operatives consider personal and skill development, good interpersonal relationships and provision of personal protective equipment as critical motivational factors than financial incentives. Again, the study revealed a significant negative relationship between motivational factors and unsafe behaviour on construction sites. It was recommended that identified motivational factors should be improved to achieve ultimate site safety.

Keywords: Unsafe Behaviour, Motivation, Operatives

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DEDICATION

I dedicate this thesis to my savior Jesus Christ who has been with me all the way.

CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND INFORMATION

A vibrant construction industry is an important means to promote employment and consequently promote economic growth (Anaman and Osei, 2007; Enshassi *et al.*, 2009). More so, the industry plays a keen role in the attainment of socio-economic policies and seen as a major driver of development especially in developing economies (Anaman and Osei, 2007). Many large-scale construction projects directly affect people's quality of life and security of life, such as irrigation facilities, roads, bridges, quarries etc. The contribution of the construction industry to economic and social development have been researched globally (Dainty and Asad, 2005; Ghoddousi *et al.,* 2014). The raise of industrialization globally brought along concerns of occupational hazards and diseases due to new complexities of construction as well as large employment of human resources in the industry (Wachter and Yorio, 2014). In view of this situation, science and technology introduced interventions such as engineering controls, protective equipment and safety regulations. Although these interventions have yielded relative decline of occupational accidents the industry still experiences challenges with achieving effective site safety. Kim *et al.* (2016) states that these systems are not effective due to unsafe practices at the workplace. This assertion is also consistent with Wachter and Yorio (2014) who stated the problem as poor employee engagement. According to Pfeffer (1998) as seen in Wachter and Yorio (2014) the 'High Performance Work Practices' (HPWP) argues that the worker has the potential to continuously improve when motivated. What then is motivation? As addressed in Dainty and Asad (2005) motivational factors vary from one person to another. He further stresses that even in the construction industry there exist different motivational factors between operatives and the

technical team. A comprehensive study indicates that motivation of construction workers in developing countries defers from wokers in developed countries (Ghoddousi *et al.*,2014). The subject of motivation has been widely researched in both past and extant studies. Many motivational theories have been propounded like Maslow's 'Needs Hierarchy Theory', Herzberg's Hygiene Theory' Vroom's Original Theory among others. These theories have been reviewed and tested in various industries as well as the construction industry

According to Bright (2007), safety motivation plays a vital role in incident reduction. Meanwhile, this is also dependent upon the safety perception of the worker. Workers bring their belief, value and vision to the compliance to safety management systems and ultimately performance of work. Shen *et al.* (2017) states that construction workers exhibit behaviours such as taking chances, avoid the wearing of Personal protective equipment, working when fatigued and poor housekeeping practices. It is important that construction managers identify individual motivation factors to keep the worker motivated. This would create the consciousness of the consequences of unsafe practices thereby promoting commitment to achieving safe working practices on the construction site.

1.2. PROBLEM STATEMENT

Human errors are inevitable in a dynamic and complex industry like the construction industry. Almost all injuries that occur on the construction site involve person-environment interaction (Jiang *et al.,* 2014 ;Saeed Al-Haadir, 2013). As acknowledged by Jiang (2014), accidents are caused by unsafe behaviour and conditions. Bright (2007) States that individuals are drawn to the workplace settings that satisfiers their characteristics. According to Kim *et al*. (2016) the perception of safety by the construction worker influences his or her commitment to adhering to safety regulations. The worker motivation engagement is ultimately significant and influences

the safe behaviour on the construction site. Some researchers work have suggested that there is a link between motivation and safety behaviours on construction site which needs to be examined to promote construction site safety.

1.3. RESEARCH QUESTIONS

The following are the research questions for the study:

1. What are the critical motivation factors of the construction worker?
2. What are the frequently occurring unsafe behaviour on construction sites?
3. What is the impact of motivation on unsafe behaviour?

1.4. AIM OF THE STUDY

The aim of this study was to establish empirically the relationship between motivation and unsafe behaviour of the construction worker.

1.5. OBJECTIVES

The following were the specific objectives of the study

1. To determine critical motivation factors
2. To determine frequently occurring unsafe behaviour
3. To determine impact of motivation on unsafe behaviour

1.6. SCOPE

This research study was carried out in Kumasi the capital of Ashanti Region in Ghana. Kumasi is the second largest city in Ghana. Being a metropolis, it has a good representation of all characteristics of the country in terms of people, business, trades, health. In recent times, Kumasi has been the hub of continuous infrastructural development such as construction of roads,

educational, health and residential facilities. This would serve as a good platform to collect relevant information from various construction sites.

The study mainly focused on building and civil construction companies with the emphasis on D1/K1 and D2/K2 class of contractors. This group of contractors were considered to carry out large construction projects and have a relatively large employment holding as well.

1.7. SIGNIFICANCE OF THE STUDY

The need to improve safety in all spheres of industrial operations to reduce financial losses, fatalities and injuries is of a global concern. The construction industry thrives mainly on the use of human effort; hence, it is important to find out the link between motivation and unsafe behaviour to give management better knowledge on how to promote good safety performance.

It would further contribute to the body of research on motivation and construction site safety. It will further serve as useful resource to stakeholders as well as aid for further research in this area.

1.8. STRUCTURE OF THE REPORT

This report has been captured under five main chapters. Chapter one introduces the subject of the study with the background, problem statement, research, aims, objectives, scope, significance of study and the structure of the report. Chapter two considers literature review related to the study. Chapter three involves research methodology. Chapter four involves analysis and discussion of data collected for the study. Finally, chapter five deals with summary of findings, recommendations and conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1. INTRODUCTION

This chapter captures the study and assessment of other research work concerning motivation and unsafe behaviour. It sets the background and context for which findings can be determined. The review will cover studies done in the following areas:

i. The Construction industry
ii. Motivation
iii. Concept of motivation
iv. Classification of motivation
v. Motivation in the construction industry: An overview
vi. Motivation factors in the construction industry
vii. Global situation of health and safety on construction sites
viii. Types of hazards on Construction Sites
ix. Challenges Facing Health and Safety on Construction Sites
x. Behaviour Based Safety
xi. Worker Behaviour in the construction industry
xii. Causes of Behaviour Change
xiii. Unsafe Behaviour on construction sites
xiv. Causes of Unsafe behaviour
xv. Worker motivation and safety behaviour: An overview

2.2. THE CONSTRUCION INDUSTRY

The construction industry generally has unique characteristics from many industries. Extensive research has been carried out on the contribution of the construction industry to the GDP of both developed and undeveloped country (Fellows, no date; Barg *et al.*, 2014; Fong *et al.*, 2016).

Barg *et al.* (2014) addressed five factors that characterised the construction industry. Firstly, construction projects are short term in nature. Every project has a start and an end date. This feature does not give opportunity to employees to either identify themselves with the company or develop a strong team spirit. Secondly, the construction industry continues to be a large employer of human labour because of its labour-intensive nature. It comprises the employment of a diverse workforce from different backgrounds with various values. Despite the emergence of mechanized systems, human effort is still needed to carry out most activities like painting, block laying and electrical fitting among others. Both skilled and unskilled personnel are used for these activities. However, human error is inevitable where human effort is required, hence the increasing concern with health and safety awareness on the construction work sites. Again, the construction environment presents many unpredictable situations. This makes every project unique in itself: which determines its own methodology, challenges and achievements. These characteristics are typical of developing countries and the Ghanaian construction industry is not an exception (Yisa *et al.*, 2000).

2.3. MOTIVATION

Motivation as described by Barg *et al.* (2014) (2014) is a management process that derives employees to initiate actions to the benefit of the organization. In Pardee (1990), he stated that individuals have different needs and aspiration in their endeavours. The behaviour shown by an individual is dependent on what motivates them. The study of human behaviour, motivation

theories and the uniqueness of the industry would be of much relevance to stakeholders in the construction industry. Consequently, a more stable and satisfied workforce would be achieved.

Many popular motivation theories have been propounded over the years. Among these are;

Maslow's 'Hierarchy of Needs Theory' (1954), Herzberg's 'Two factor theory' (1964), Vroom's 'Expectancy' and McClelland's 'Need Theory'. Many studies have reviewed these theories over the years in relation to various industries. It was discovered that there is a common element (need for improvement, satisfaction and human behaviour) that runs through them (William, 2010; Ghoddousi *et al.*, 2014). Pardee (1990) for instance comparing Maslow's Hierarchy of Needs Theory to Herzberg's Two Factor Theory found this relationship; Maslow's higher level needs serve to motivate people as Herzberg's motivators which are both intrinsic in nature.

2.3.1. Maslow's Hierarchy of Needs (1943)

Abraham Maslow believed that individuals possess an inherent drive to achieve great potentials. According to him in (Maslow and Green, no date), human needs are arranged in hierarchies such that when one need is satisfied, it births the desire for another. He classified these needs into five categories, which assumes a pyramidal shape with lower needs at the base and higher needs as you move to the apex. Many studies have shown that the Maslow's theory of needs is difficult to relate to the work environment (Rose and Manley, 2011; Ghoddousi *et al.*, 2013).

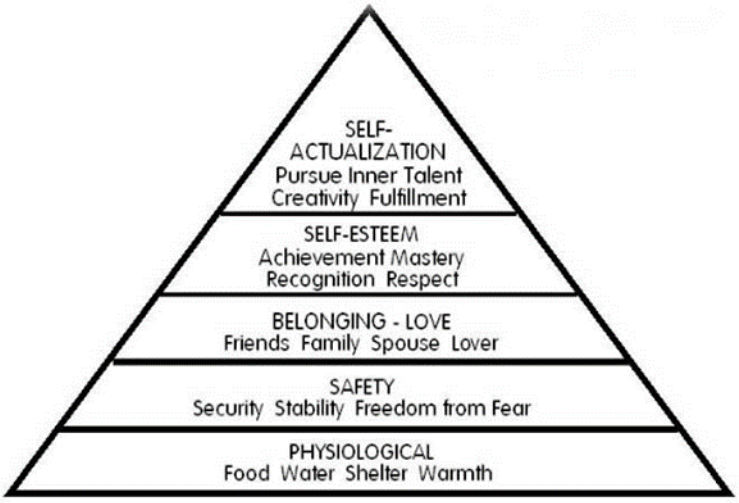

Figure 2.1 Maslow's Hierarchy of Needs

Source : (Ramlall, 2004)

From figure 2.1 above, the following can be observed:

- Physiological needs: Food, Water, Sex, And Shelter
- Safety needs: Protection against threat and deprivation.
- Social needs: Giving and receiving of love, satisfaction, and acceptance.
- Ego needs: Need for accomplishment, recognition, prestige.
- Self-actualization needs: 'The need to realize one's potentialities for continued self-development and the desire to become more and more of what one is and what one is capable of becoming'

Source: (Pardee,1990)

2.3.2. Vroom Expectancy Theory

According to Ghoddousi *et al.* (2014) Vroom's expectancy theory can be used to explain construction worker's motivation in developing countries. A comprehensive review carried out in this paper shows that Vroom's expectancy theory adequately deals with worker motivation in

the organisation. The theory delves into studying the factors that influence individual decisions. He further explains that behaviour is the outcome when the individual makes conscious choices among options with the purpose of optimising satisfactory result. Usually, employees come to the organization with their own expectation whereas the organization on the other hand has its own expectation of the worker.

The rationale behind Expectancy theory is graphically displayed below;

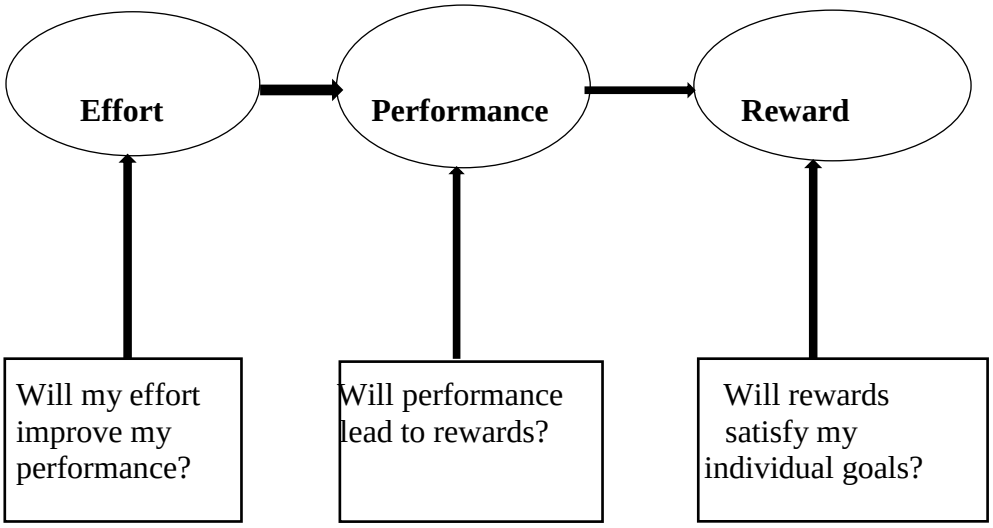

Figure 2.2: Vroom's expectancy model of motivation.

Source: (Barg *et al.*, 2014)

2.3.3. McClelland's Need Theory

The McClellad's Need Theory proposes that when a need is strong in a person, its effect is to motivate the person to use behaviour, which leads to satisfaction of the need. He further explained this idea in three dimensions of 'needs' the need for achievement, affiliation and

power. To comprehend human behaviour and how differently they are motivated, the needs and dispositions of the individual must be assessed (Barg *et al.,* 2014).

Secondly, the desire for Achievement includes the need to do better, find solutions to problems, and to overcome difficult tasks. The Need for Affiliation is the drive for acceptance by society and friendly relations with others (William, 2010).

Lastly, the desire for power is executed at the point where the individual wants to exercise authority over others and affect their behaviour (Yisa *et al.,* 2000).

2.3.4. Herzberg's Two Factor Theory

Herzberg's Two-Factor Theory has been broadly explored in relation to employee motivation in various industries (Pardee, 1990). Herzberg divides motivation into two factors namely motivation factors (Satisfiers) and hygiene factors (dissatisfiers). He explains that improving motivating factors do not have any impact on hygiene factors. Hence, the opposite of 'Job satisfaction' is 'No Job Satisfaction' on the other hand, the opposite of 'dissatisfaction' is 'no dissatisfaction'.

He proposed that job satisfaction factors can be addressed under two broad lights Intrinsic and Extrinsic motivation. This is consistent with other research findings (Wan Fauziah, *et al*., 2013).

As cited by Barg *et al*. (2014) Herzberg suggested that employees are motivated by primarily six factors called the Job content. This include; personal growth, recognition, the work itself, achievement, responsibility, advancement. These factors when available bring about job satisfaction hence are referred to as motivators.

On the other hand, Hygiene factors known as contextual factors affects the measure to which the employee feels dissatisfied with his work. Factors such as job security, working Conditions,

company policies, co-workers and supervisor relations when not present would cause the worker to be dissatisfied. Contrary wise, the theory states that an improvement in the hygiene factors will have no effect on job satisfaction.

2.4. CONCEPT OF MOTIVATION

According to the Cambridge advanced learner's dictionary, 'motive is a reason to do something'. It is what prompts an individual to act in a certain way or at least cultivate a preference for a particular behaviour.

Motivation as defined by Yorks (1976) as seen in Pardee (1990) are those forces within an individual that propels him to satisfy basic needs or wants. Maslow in his Hierarchy of needs theory propounded that unsatisfied needs generate motivation. In other words, a satisfied need does not push an individual to change behaviour but an unsatisfied need in order to achieve a reward. Again, the requirement to determine what reward will satisfy the individual is the level of the need (Ramlall, 2004). The underlying issue is that motivation of the employee is imperative for the survival of any organization. To enable management to effectively respond to the needs of their employees, the subject of motivation must be broadly rehearsed. This way it can critically determine and meet expectations of the worker (Barg *et al.,* 2014).

2.5. CLASSIFICATION OF MOTIVATION

Herzberg's in his two factor theory, divided motivation factors into intrinsic and extrinsic motivation. These represent motivation influenced by internal incentives and external incentives respectively. Other Research studies have agreed with this distinction as seen in (Ramlall, 2004; Konlan, 2011) which states that intrinsic motivation comes from seeking satisfaction in the work itself while, extrinsic motivation is obtaining satisfaction outside the work itself.

Rose and Manley (2011) mentioned that the perception of motivation varies from one individual to the other. In Vroom's expectancy theory, he stated that some people focus on intrinsic factors while others concentrate on extrinsic rewards.

2.5.1. Intrinsic Motivation

Intrinsic motivation can be described as an inherent interest to perform a task without any external incentive. This kind of motivation comes from the pleasure an individual obtains in performing the job. Motivation is derived from the nature of the job itself, interest in the job, personal growth and advancement. It does not involve working to achieve external rewards or recognition (William, 2010). Individuals who are intrinsically motivated set personal challenges and goals, which they can self-regulate to achieve results without external influence. It is dependent on the individual attitude and differs from persons and circumstances. To such people external motivators like financial incentive, external deadline among others do not determine their drive to perform. Hence, satisfaction is 'self-motivation'.

2.5.2. Extrinsic Motivation

According to William (2010) extrinsic motivation is exhibited when an individual undertakes an activity in order to attain external rewards. The source of extrinsic motivation is derived from the physical environment of the individual. The intention of the individual is to be pushed by an external package. Here, the individual does not have a personal drive to pursue a line of action if a reward would not be achieved by the end of the day. Herzberg's two factor theory addresses these external factors as motivators. These economic rewards, include;

i. Pay increase
ii. Promotions

iii. Fringe Benefits

iv. Pension Right

v. Material Goods

vi. Security

2.6. MOTIVATION IN CONSTRUCTION: AN OVERVIEW

According to Ghoddousi *et al*. (2014) the motivation of the workers is a major contributor to improved production in the construction industry. According to various studies, Rose and Manley (2011); Cardoso *et al.* (2015) the study of motivation in construction is relatively limited compared to other subject areas. More specifically only few researchers have provided a broad exploration on the motivation of construction workers. Over the years, the trend of research has shown that manufacturing industry has experienced more productivity than in the construction sector. Motivation is considered to impact project performance greatly.

All the above discussions confirm that it is essential for construction managers to possess adequate insight into workers' motivation (Yisa *et al*., 2000). The main activities of any project would determine drivers that influence motivation of project participants. According to Rose and Manley (2011) some studies have shown that financial incentives are considered key means of achieving improved performance in the construction industry. Over the years, financial incentives have been used to stimulate higher productivity on construction projects. The purpose of this exercise was to drive the worker to work harder to achieve a set target for a specific task (Yisa *et al*., 2000; Konlan, 2011; Rose and Manley, 2011). However, the paper concluded that the construction worker considers building project relationships and good conditions as more essential factors of motivation. Ghoddousi *et al.* (2013) came out with similar findings.

However, does financial incentive actually serve as motivation? Some research studies have come up with divergent views. Others agree with this assertion yet, evidence on the impact of financial incentives on performance is not conclusive.

The research gap identified is the factors that drive motivation levels. This is deferring from one study to the other. This can be explained due to the unique nature of every project and also differing human behaviour and personal characteristics (Porter *et al*., 2003 ; Cardoso *et al*., 2015).

Some researchers have outlined factors inhibiting construction workers motivation as relating problems with incentives, the work environment, culture and management (Ghoddousi *et al.*,2014).

These factors are expounded below;

a. Incentives
   i. Payment delay
   ii. Lack of a financial incentive scheme
   iii. Low salary and bonus
b. Work Environment and Culture
   i. Rework
   ii. The extent of change orders during execution
   iii. Overcrowding
   iv. Operatives interface
   v. Quality level of drawings
c. Management

i. Incompetent supervisors

ii. Unrealistic scheduling and performance

iii. Shortage of materials on site

2.7. MOTIVATION FACTORS IN THE CONSTRUCTION INDUSTRY

According to Maloney and McFullen (1986) as seen in Ghoddousi *et al.* (2014), the contractor needs to focus on what actually contributes to productivity and encourage workers to achieve a unique performance. An adequate well-defined, reasonable and time bound goal is a suitable incentive to increase motivation on the construction site.

The following factors have been deduced from various literature, these factors when deployed well can cater for individuals who are either motivated intrinsically or extrinsically.

i. Expressing appreciation for effort executed in work.

ii. Introduction of responsibility to reduces boredom

iii. Worker participation in decision making

iv. Introduction of competition in achieving targets

v. Good social relationship among co-workers and management.

vi. Bonus or rewards.

vii. Amount of remuneration

viii. Amount of freedom at work

ix. Chance for getting a promotion

x. Chances to learn new things

xi. Respect receive from the co-workers & supervisors

xii. Opportunity for challenging work

xiii. Provision of Tools and equipment

xiv. Chances to perform task which one finds interesting

xv. Physical surroundings (washrooms, lunchrooms, etc.)

xvi. Team to work with.

xvii. Supervisor understanding of the quality and technical details.

xviii. Supervisor's direction and support

xix. Safety procedures on site

xx. Opportunities to develop skills and abilities

xxi. Overtime Observation and payment

xxii. Job security

xxiii. Seeing the ultimate results of work.

xxiv. Supervisor's positive feedback after successfully completing a task.

xxv. Payment of Salary on time

xxvi. Challenging task

xxvii. Accommodation (Provision of physical accommodation or housing allowance)

xxviii. Transportation (Vehicle at your disposal, allowance for transportation, transportation from a location to site and back)

xxix. Medical care (Having a particular hospital to attend in case of illness or subsidising the cost of hospital bills)

xxx. Provision of Personal Protective Equipment

Source: (Lunt *et al*., 2008; Ghoddousi *et al*., 2014)

2.8. GLOBAL SITUATION OF HEALTH AND SAFETY ON CONSTRUCTION SITES

The construction industry is a leading contributor to both the economic and social development of most economies globally (Wachter and Yorio, 2014). The health and safety of employees have

been issues of concern following industrialization (Kim *et al*., 2016). Again, in recent times, the need to significantly reduce accidents and improve productivity has necessitated the study of health and safely important globally (Jiang, *et al*., 2014). According to Enshassi *et al*. (2009) both construction companies and employees feel the implication of accidents and fatalities. It results in huge financial losses to many construction firms.

According to (China State Administration of Work Safety 2012) as addresses in Jiang *et al.* (2014) the number of lethal injuries reported on construction various sites amounted to 2,437 in 2012. This amount exceeds incidents in the mining industry. This is similar to other research work that have provided various statistics that prove that a higher percentage of fatality occurs in the construction industry compared to all other industries put together (Asilian-Mahabadi *et al.*, 2018).

2.8.1. Types of Hazards on Construction Site

Various researchers have classified hazards into two groups, namely the physical injury and the ill-health hazards. Physical injury hazard comprises death consequences and ill-health are characterized by an extended period of sickness which may eventually lead to death (Davis V. and Tomasin K. 1990).

The following are common hazards on construction site;

i. Working at height
ii. Fire
iii. Suspended load (Hit by falling object)
iv. Trip and fall
v. Manual handling

vi. Noise

vii. Wrong operating attitude of the users of the equipment or plant

viii. Chemical substance

ix. Dust

x. Electricity

2.8.2. Challenges Facing Health and Safety on Construction Sites

Some characteristics of the construction industry such as its transient nature of employees, short term nature of projects, diverse working environment and conditions, production orientated industry, complexity among other have affected safety performance in the industry. These barriers distort the formation of safe behaviour in construction workers (Lunt *et al.*, 2008). The short-term employment in the construction industry makes inculcating safety culture into the workers difficult. It makes it difficult for the individual to learn organizational values and culture (Lunt *et al.*, 2008). Again, factors such as inadequate supervision, lack of training, negligence, inexperience affect safe performance of task.

The performance of many task in the construction industry involves exposure to different types of hazards. Many contributors such as inadequate knowledge and information on safe procedures and hazards, personal protective equipment and new technologies cause these hazards (Lunt et al., 2008).

Studies have shown that the following are some causes of accidents on construction sites especially in developing countries;

i. Poor safety awareness from top leaders;

ii. Lack training;

iii. Poor awareness of managers;

iv. Reluctance to input resources for safety;

v. Reckless operation;

vi. Lack of certified skill labor;

vii. Poor equipment

viii. Lack of safety regulation;

ix. Lack of organizational commitment;

x. Low education level of workers;

xi. Poor safety conscientiousness of workers.

(Tam *et al*., 2004; Jiang *et al.*, 2014)

2.8.3. Behaviour Based Safety

Practically, all injuries that occur on the construction sites involve a person-environment interaction (Al-haadir et al., 2013; Lunt et al., 2008; Jiang et al., 2014). Behaviour-based safety concentrates on averting and amending workers' unsafe behaviours through interventions such as worker engagement (Lunt et al., 2008; Wachter and Yorio, 2014). He further expounded that even though the responsibility of acting safely has been placed on the employee, studies have shown that safe behaviour alone is not sufficient to achieve an accident free working site. To facilitate safe behviour at all times management must create the right 'safety climate'. Safety climate connotes management commitment to safety by providing appropriate materials and facilities to enable the worker to perform in the required manner (Lingard, 2010; Kim *et al*., 2016). For instance, if the worker is not provided with Personal Protective Equipment to perform a task his ability to identify hazard alone would not prevent an accident form occurring.

Al-haadir *et al.* (2013) suggested that behaviour based safety systems can be incorporated into the planning and designing to help detect hazards related to different various construction activities before the commencement of work. At this stage, construction workers should be involved to enable them to understand and recognize these hazards and know how to manage them.

Many accidents that occur in the construction industry can be attributed to unsafe acts and at risk behaviours. Extensive research has shown that Safety Behaviour contributes to the root cause of accidents (Wachter and Yorio, 2014; Shen *et al*., 2017). To understand how to reduce accidents on construction site there is the need to reduce unsafe behaviour. An extensive research have shown that the use of Behaviour Based Safety (BBS) would enhance achieving a safe work environment.

2.8.4. Worker Behaviour in the Construction Industry

Behaviour is an act exhibited by an individual that can be visible to others. The performance of many task in the construction industry requires the use of manual effort (Kim *et al.,* 2016). Studies have shown that every project is unique in itself. Hence, it is difficult to preconceive the actual reaction of workers to situations on the construction site. The behaviour of the construction worker is dependent on prevailing situations such project location, duration, required quality, work pressure, cost and safety management systems (Lunt *et al*., 2008; Hosseinian and Torghabeh, 2012). Because workers encounter these changes on daily basis, it presents them with different hazards to deal with. Therefore, the measurement of factors that influence worker behaviour with regards to safety and productivity in a dynamic workplace has become more complex (Asilian-Mahabadi *et al.*, 2018).

2.8.5. Causes of Behaviour Change

According to Knott *et al.* (2007) as seen in Lunt *et al*. (2008) behaviour change can be described as any interference that disturbs the kind or occurrence of conduct carried out through modifying contributors of behaviour or its consequences. Behaviour change as considered in health and safety management is to orient new behaviour to become normal practices for the individual (Shen *et al.,* 2017)

According to Wachter and Yorio (2014) management conditions usually affect workers' behaviours by determining the individual and environmental conditions. Traditionally, behaviour safety programmes are interventions made by management to improve safe behaviour.

According to extensive research carried out in (Health and Safety Laboratory for the Health and Safety Executive 2008) the application of any mechanism to ensure behavioural change in the UK construction would require overcoming a variety of impending barriers that characterize the industry. These barriers are the major characteristic of the construction industry globally as explained below.

i. **Transience** – The workforce of the industry is virtually transient in nature. Delivery of behavioural safety programmes becomes a challenge to various companies. Transient contracts can prevent the achievements of inculcating organizational safety values in workers. This is because the issue of 'ownership' of labour is absent. Firstly, the employee may move from job to job due to non-permanent nature of employment. Hence, the challenge to educate new entrants from time to time is resource intensive. Secondly, team building over a short-lived project is nearly impossible because employees do not build commitment of achieving one goal over a short period

ii. **Production pressure-** According to Mitropoulous *et al*. (2005) as seen in (Lunt *et al.*, 2008) production pressure can described as a push to increase production as the expense of safety. Mostly workers are penalized for drop in production; this would lead to a negative attitude towards safety because workers would try to reach targets.

iii. **Site complexity**- Every construction site comes with its dynamic and complex characteristic (Lunt et al., 2008). These practical factors influence behaviour change. This may require operatives to adjust to situations such as weather 'conditions, jobs, materials, client priorities, tradesman, and changing regulations, and different tradesman on site', presents certain challenges in maintaining consistent standards and vigilance.

iv. **Supervisor as a gatekeeper**-Supervisor's appreciation of safety values would determine team's performance on safety. As the old adage goes 'Leadership by example'. The workers are most likely to follow the pattern of procedures followed by their immediate supervisor (Lunt *et al.*, 2008, p.74).

2.8.6. Unsafe Behaviour on Construction Sites

Safe behaviour is usually considered as uncomfortable and inconvenient condition. According to Jiang *et al*. (2014) without perceived safety, commitment from management worker may exhibit unsafe acts. Nonetheless, other researchers state that accident rates did not reduce even with commitment hence, it is imperative to discover the relationship between management commitment and unsafe behviour as it is currently unclear from management perspective (Shen, *et al.*, 2017).

The motivation has to be linked with a safe working environment to achieve a outcome desirable outcome (Lunt *et al.*, 2008). However, motivation alone does not produce the positive change

unless there is an appropriate safety climate to maintain safe manner and no decline to unsafe behaviour especially in developing countries. (Yisa *et al*.,2000; Aiyetan and Olotuah, 2006).

Creating the consciousness of the consequences of unsafe practices in terms of personal harm to the individual, coworkers, as well as family would help individuals appreciate the importance of safe behaviour (Lunt et al., 2008; Jiang, Fang and Zhang, 2014). Shen *et al.* (2017) discovered that construction workers exhibit the following unsafe behaviours;

i. Lack of attention and concentration on the job
ii. Working when fatigue,
iii. Unsafe position or posture
iv. Use of unsuitable access/failure to use access,
v. Not using Personal Protective equipment,
vi. Using Short cuts to safe time
vii. Taking chances
viii. Non certification of Scaffolding be used to access heights,
ix. Poor housekeeping practices
x. Not wearing personal protective equipment
xi. Working on electricity without isolation of power
xii. Cutting corners
xiii. Distraction behaviour at height,
xiv. Poor storage and stacking of materials

2.8.7. Causes of Unsafe Behaviour

In Jiang *et al*. (2014) an extensive review of literature was carried out concerning how unsafe behaviour occurred. The underlying causal agent according to this paper is Cognitive Failure.

The writer also based this on recognized models proposed by (Surry, 1969). It is on this basis that the following causes are analysed. They are captured under five stages:

STAGE 1: Hazard Detection

i. Inability of the worker to intentionally search for hazards. This may be a result of over confidence or because of the attempt to save time.
ii. Inability to detect hazards due to obstructions in the working area, hazards beyond physical skills, not expecting hazards, underrate risk, etc, Fatigue, work overtime, lack of sleep and low vigilance

STAGE 2: Recognizing hazards

At this stage, the individual might have identified hazard but lack relevant knowledge to manage such situations.

STAGE 3: Perceiving responses.

At this stage, a cognitive failure can occur because of a low rate of implementing relevant knowledge. Again, negative impact from colleagues and management happen because of deficiency of relevant knowledge.

STAGE 4: Selecting a safe response

At his stage, the worker is required to choose a safe response to an identified hazard. When the individual fails to recognize the importance of the safe response or considers response as inconvenient may not select a right response.

STAGE 5: Executing the safe response.

Many factors may distract the execution of a safe response such as fatigue, lack of applicable knowledge and absence of supportive conditions.

The above stages can be further classified based on workers' Perceived Behaviour (Individual) as well as their physical conditions (Environment).

Individual Factors

The above five stages explained above can be influenced by the

i. Safety awareness
ii. Safety knowledge
iii. Attitude
iv. Subjective Norm
v. Perceived behavioural control
vi. Worker's physical condition

Environmental Factors

The extent to which workers are exposed to certain hazards on construction site is based on site arrangements. According to Kines (2003) as seen in Jiang *et al*. (2014) a worker in high hazardous environment may decrease his ability to detecting hazards as explained in stage.

2.8.8. Worker Motivation and Safety Behaviour: An Overview

A diverse workforce in terms of culture and values characterizes the construction industry. To enhance a motivated workforce with a common safety culture, it is important to investigate into the present culture to reveal their core values. (Shen *et al*., 2017) states that safety behaviour is influenced by individual cultural background.

In addition to understanding the culture and values of the existing workforce, a good knowledge of motivating factors would encourage a significant improvement in worker motivation (Al-haadir *et al.*, 2013). Organizational culture refers a system of shared values common to members that differentiates them from others. Jiang *et al*. (2014) stated that, it is expedient for companies to ensure that safety resources are invested to the development of a safe working climate before attempt to alter behaviour change are pursued.

Again, safety equipment, materials, and facilities must be accessible to workers on site. This is considered as the basis for achieving safe behaviour.

According to review done in Lunt *et al*. (2008) motivation in itself cannot achieve behaviour change automatically. Motivation is contingent on the employees, which can be considered intrinsic motivation as discussed previously in this paper. The following factors may be considered to improve safety

i. Possessing the right knowledge of the job and surround environmental conditions
ii. Developing appropriate attitudes safety management systems
iii. Appropriate technical, health and safety skills
iv. The presence of company social standards that are constant with the new behaviour necessary

v. Minimization of any apparent obstacles in the working environment that may get in the way of workers in their bid to improved safety.

On the other hand, worker engagement helps to modify dormant contributors to unsafe behaviours, strengthening of safer practices, which would sustain change over time. The worker feels respected and satisfied to have the opportunity to influence management decision. This will ultimately promote worker commitment to management decisions. Worker engagement can be achieved through the following;

i. Induction events
ii. Site level engagement through regular; persuasive hazard communication techniques that capture the possible adverse imports of unsafe behaviour.
iii. Daily site task briefings
iv. Safety communication boards
v. Informal discussions during site tours by top managers: reinforce safe behaviours
vi. Tool-box talks concentrating on crucial safer working practices
vii. Observation, feedback and goal setting skills led by competent supervisors
viii. Observations led by operatives to identify and discuss unsafe acts
ix. Reward or penalty-based systems for safe/unsafe acts
x. Provision of a tool kit
xi. Use of Slogans. Example: S.L.A.M

"STOP engage your mind before your hands.

LOOK at the workplace and find the hazards (Report to the supervisor).

ASSESS the effects that the hazards have on people, property and the environment.

MANAGE with effective controls and advise others."

This is summarized in the equation below;

"The right knowledge, the right attitude and the right skills = Motivation"

"Motivation + Strategies on how = Immediate behaviour change"

"Immediate behaviour change + Strategies that remind = Sustained behaviour change"

Source: (Lunt *et al*., 2008)

2.9. CONCEPTUAL FRAMEWORK: RELATIONSHIP BETWEEN MOTIVATION AND UNSAFE BEHAVIOUR:

Conceptual framework directs the researcher to define measurable variables and determine what statistical relationship exist between them (Borgatti, 1999) From the extensive literature review carried out by the researcher, various factors emerged as critical motivation factors as stated in 2.7. These factors include both intrinsic and extrinsic motivation as described in previous paragraphs of this chapter. They are considered independent variables that is their behaviour is not changed by other related samples (Ramachandran & Tsokos, 2009).

One the other hand, frequently occurring unsafe behaviours as defined in this model is the dependent variable. Variables identified in literature review can be seen in 2.8.6 of this capture.

These two variables (dependent) and Independent are illustrated in the diagram below. The researcher will use the conceptual model below to discuss her findings from field survey.

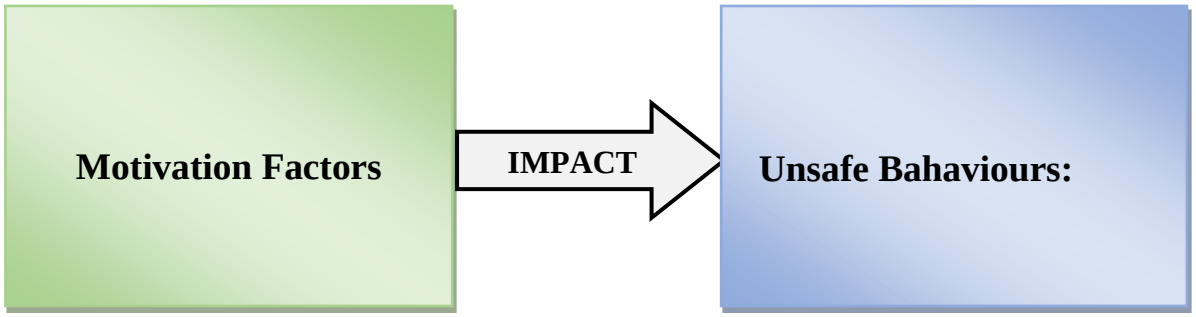

Figure 2.3: ***Conceptual Model of relationship between critical motivating factors and unsafe behaviour.***

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. INTRODUCTION

Methodology design as described by O'Leary (2014) includes a design of the typical framework in which the research would be carried out. This chapter describes the research design, target population, sample and sampling procedures, procedure for data collection and data analysis techniques.

3.2. RESEARCH DESIGN

Agbaje and Alarape (2010) described research design as an outline of the detailed plan of how the the study will be conducted. Kothari (2004) states that the provision of this systematic procedure ehnaces gathering of relevant information to produce valid findings. The various strategies work together to achieve the research objective.

There are two major research strategies. They include quantitative and qualitative research. Quantitative approaches are more precise, result oriented, which comprises the collection of numerical data to explain, predict, and or control situation of interest (Bell, 2014). This approach is found most appropriate by the researcher to reach the target group. The researcher adopted the descriptive survey method, which comprises the use of structured questionnaire to obtain data.

3.3. SOURCES OF DATA

The study makes use of both primary and secondary data. Secondary data was obtained from books, previous theses, journal, articles, websites and work of previous researchers. The Primary sources of data were obtained through information retrieved by administering of questionnaires. This approach was selected due to time constraints to the researcher.

3.4. TARGET POPULATION

The target population of the study will comprise all artisans and unskilled workers within the Ghanaian construction companies registered with the Ministry of Works and Housing with D1 and D2 classification. This is because these companies undertake relatively bigger project, which requires employing a larger number of employees. In addition, non-empirical evidence shows that D1/D2 companies have good organizational set up that offer themselves to refined academic research work than the lower class of companies. The specific group under consideration will include would include mason, carpenter, steel bender, painter and Operatives. (Dawson, 2002)

3.5. SAMPLE AND SAMPLING TECHNIQUE

The population size could not be determined due to non-availability of updated D1/K1 and D2/K2 contractors' list. A non-probability sampling technique was adopted using the purposive and convenience sampling to select 50 respondents. According to Kathori (2004), the researcher uses purposive sampling to select samples who provide the best information to achieve the study's objectives. More so, convenience sampling is relatively fast and inexpensive in obtaining samples within a limited period and proximity to the researcher (Creswell, 2009).

3.6. RESEARCH INSTRUMENT

The research instrument used for this study was a structured closed ended questionnaire with few open-ended sections for respondents to specify. The questionnaire was developed based on information retrieved from thorough review of literature. The literature review was however guided by research questions.

The questionnaire was concisely designed in order to generate reliable data from respondents. It was structured into the following categories;

Part A: Background information of the respondent.

Part B: Critical motivation factors of the construction worker

Part C: Frequently occurring unsafe behaviour

In part A, the respondents were required to provide information on education, years of experience etc. However, Part B, was designed using the five-point Likert scale to rank critical motivation factors. Part C required respondents to rank various unsafe behaviour based on how frequently they occurred on their work sites.

3.7. DATA COLLECTION

An introductory letter was obtained from the department of Construction Technology and Management Department (Kwame Nkrumah University of Science and Technology) to assure respondents that the exercise was purely academic and confidential. The purpose of the study was explained to participants to enable them to provide credible information without any undue influence. Voluntary participation was emphasized.

A period of one week was used to for administration and collection of all questionnaire.

3.8. DATA ANALYSIS

Data analyses helps to simplify large amount of information gathered into results (Naoum, 2002) The responses to the questionnaire were analysed using of the Statistical Package for Social Science (SPSS) version 23.0 To ensure consistency, the responses were coded. Descriptive and inferential statistics were used to analyse both the demographic data and dependent variables respectively. Simple mean score rankings and standard deviations were also used. The study further utilised Relative Importance Index (RII) to ascertain the level of significance of the motivation factors.

Lastly, the study employed partial least square structural equation modeling (PLS-SEM) to estimate the relationship between motivation and unsafe behaviour on construction sites. The path modeling and parameter estimation analyses were performed using SmartPLS 3.0. due to the sample size of fifty.

3.9 ETHICAL CONSIDERATIONS

According to Bell (2010), research ethics refers to codes of practice that clearly states the type of agreement the reseacher enters with the subjects to be studied. These standards should ensure voluntary participation, confidentiallity, anonymity and uses of data when provided. Using survey questionnaire, it was ensured that questions were simple, unambigious and understandble to stir the interest of the participants (O'Leary, 2014). The following are ethical considerations are expounded below;

Instituitional Consent

An introductory letter stating the pupose of this study was obtained from the Construction Technology and Management Department which was presented to each construction site visited. At each construction site, site managers granted the researcher permission to engage operatives and proceed with data collection when they agreed to participate.

Voluntary Participation

It was explained to each respondent that participation was voluntatry hence one could refuse to answer any question or withdraw at any phase of the study. No respondent was coerce to express their views on the questions asked. This allowed participants to give objective views on the subject being studied.

Confidentiality and Anonymity

Participants were assured that information provided were highly confidential. This means that the details provided were not presented in a way to compromise the privacy of the respondant or cause any harm to the individual.

By anonymity the reseacher ensured that none of the participants could be identified or associated with any information provided. By this personal details such name, address, gender were not collected. This made it difficult for even the researcher to identify which responses came from a particular respondent (Bell, 2010).

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF RESULTS

4.1. INTRODUCTION

This chapter presents results and discussion of data obtained from field survey on construction sites in the Kumasi Metropolis. The researcher physically distributed survey questionnaire and online as well. Out of about 65 questionnaires, distributed 50 were retrieved. The basis for these analyses is based on the 50 responses received.

The findings obtained from this study were compared with data collected from secondary sources to allow drawing meaningful conclusion and recommendations. The tools that were used for data analysis include simple descriptive statistics, mean score and frequency. To enhance better appreciation of the data; tables are used to represent results.

4.2. BACKGROUND INFORMATION OF RESPONDENTS

Table 4.1: Role in the company

Variable	**Frequency**	**Percentage (%)**
Role in the Company		
Mason	18	36
Carpenter	14	28
Steel Bender	4	8
Operator	2	4
Helper	9	18
Electrician	2	4
Painter	1	2
Total	*50*	*100*

Source: Field Survey (2019)

From Table 4.1 it can be inferred that, majority of respondents are masons by profession this is represented by 36% which represents the highest percentage. On most construction sites visited,

the project was at the superstructure stage, which involved works like block and concrete work, formwork, and rendering. Carpenters who represents 28% closely follow this. Helpers represents 18% of the respondents. This group assist artisans to carry out task or undertake any menial task. The steel benders represent 8% of the respondents, Operators represents 4% electrician represents 4% and painters represents 2%.

Table 4.2: Level of Education

Level of Education	Frequency	Percentage (%)
HND	4	8
NVTI	7	14
SHS	22	44
JHS	16	32
None	1	2
Total	*50*	*100*

Source: Field Survey (2019)

The table 4.2 above represents the educational level of the respondents. It can be observed that most respondents have attained Senior High School education, which represents 44%. Again, 32% represents Junior High School education. Respondents who had a formal trade education (National Vocation Training Institute) were 14%. It was observed on the field that artisans who fall in this category required little or no assistance to complete their questionnaire. Lastly, 2% of the respondents had no formal education.

Table 4.3: Years in practice

Years in Practice	Frequency	Percentage (%)
0-5 years	12	24
6-10 years	18	36
11-20 years	14	28
More than 20 years	6	12
Total	*50*	*100*

Source: Field Survey (2019)

The table 4.3 above represents data on the years of experience of respondents. From the table majority of respondents fall between 6-10 years' experience with a percentage of 36%. Secondly,

28% of respondents have been in practice for 11-20 years. Again, 24% of respondents have practiced their various roles for 0-5years. Lastly, 12% of respondents have more than 20 years of working experience. The above results indicate that a higher percentage of respondents have been in the construction industry for a considerable number of years. This presents them as a reliable source of data for this study.

Table 4.4: Period of Employment

Period of Employment	Frequency	Percentage (%)
6 months	5	10
1-2 years	20	40
3-5 years	6	12
More than 5 years	19	38
Total	*50*	*100*

Source: Field Survey (2019)

Table 4.4 represents period of employment in current construction company. One characteristics of construction project is its short term nature (Lunt *et al*., 2008). This is clearly evidence in the table with 40% of respondents in working in the current firm between 1-2years. Again, 38% of respondents were employed for more than 5 years represented. 12% represented 3-5 years of working with the firm. Finally, 10% of respondent's years with the was 6montths.

4.3. CRITICAL MOTIVATION FACTOR

To determine the critical motivation factors of construction workers, respondents were required to rank identified critical factors from literature according to their perceived significance. A Five-point Likert scale was provided for respondents to rate variables based on their level of significance. On the scale, **1** represents 'Strongly Not significant' **2** represents 'Not significant' **3** represents **'**Average' **4** 'Significant' **5** 'Strongly Significant'.

Table 4.5 below shows frequency, standard deviation and the mean scores of the respondents from the highest mean to the lowest as well as their RII scores.

The Relative Importance Index (RII) was used to analyse data collected. The formula used was;

$\boldsymbol{RII = \frac{\sum w}{s \times N}}$ Where, $\sum$**W** is the weighted sum**, S** is the highest Likert point, **N** the total response.

The rank demonstrated in the table above determine which factors respondents deemed important compared to others. The researcher identified 27 critical factors of motivation from literature. These factors are ranked from the 1ST to 27th in the table below.

Table 4.5: Critical motivation factors

Variable	Rating					Mean	RII	Rank
	1	2	3	4	5			
Opportunities to develop skills and abilities	**0**	**0**	**4**	**14**	**32**	4.56	0.912	1st
Respect received from co-workers & supervisor	**0**	**0**	**8**	**7**	**35**	4.54	0.908	2nd
Supervisor's positive feedback after successfully completing a task	**1**	**2**	**5**	**9**	**33**	4.42	0.884	3rd
Provision of Personal Protective Equipment	**0**	**2**	**6**	**13**	**29**	4.38	0.876	4th
Supervisor's understanding of the quality and technical details	**0**	**2**	**4**	**19**	**25**	4.34	0.868	5th
Team to work with	**0**	**4**	**4**	**13**	**29**	4.34	0.868	6th
Safety procedures on site	**0**	**5**	**4**	**18**	**23**	4.18	0.836	7th
Chances to learn new things	**3**	**1**	**8**	**10**	**28**	4.18	0.836	8th
Medical care (Having a particular hospital to attend in case of illness or subsidising the cost of hospital bills)	**3**	**4**	**2**	**13**	**28**	4.18	0.836	9th
Holidays and free time (lunch breaks) during work	**2**	**6**	**3**	**11**	**28**	4.14	0.828	10th
Good relation with colleagues	**0**	**0**	**15**	**13**	**22**	4.14	0.828	11th
Overtime observation and payment	**0**	**5**	**11**	**7**	**27**	4.12	0.824	12th
Job security (permanent employment)	**2**	**3**	**7**	**13**	**25**	4.12	0.824	13th
Amount of salary	**3**	**2**	**7**	**14**	**24**	4.08	0.816	14th
Transportation (Vehicle at your disposal, allowance for transportation, transportation from a location to site and back)	**2**	**4**	**9**	**9**	**26**	4.06	0.812	15th
Payment of Salary on time	**1**	**2**	**11**	**15**	**21**	4.06	0.812	16th
Provision of tools and equipment for task	**5**	**1**	**4**	**17**	**23**	4.04	0.808	17th

Bonus at the end of project or year (showing appreciation at the end of the project and year	**5**	**4**	**5**	**7**	**29**	4.02	0.804	18th
Accommodation (Provision of physical accommodation or housing allowance)	**3**	**8**	**4**	**6**	**29**	4.00	0.8	19th
Seeing the ultimate results of work	**0**	**3**	**12**	**17**	**18**	4.00	0.8	20th
Employee participation in decision making	**2**	**3**	**10**	**15**	**20**	3.96	0.792	21st
Chances to do the things which you do best and like most	**1**	**5**	**10**	**14**	**20**	3.94	0.788	22nd
Chance for getting a promotion	**4**	**4**	**5**	**17**	**20**	3.90	0.78	23rd
Type of physical surroundings (washrooms, canteen etc.)	**5**	**4**	**9**	**9**	**23**	3.82	0.764	24th
Amount of freedom in your work	**3**	**5**	**12**	**13**	**17**	3.72	0.744	25th
Challenging task	**1**	**10**	**11**	**11**	**17**	3.66	0.732	26th
Opportunity for challenging work	**4**	**8**	**7**	**16**	**15**	3.60	0.72	27th

Source: Field Survey (2019)

From Table 4.5 the highest-ranking factor was '**Opportunity to develop skills and abilities'.** Out of 50 respondents, 32 workers agree that this factor is 'strongly significant' 14 thought the above-mentioned factor is 'significant' and 4 were 'neutral'.

The second ranking factor was '**Respect received from co-workers and supervisor'** represented by 35 respondents with 'strongly significant'.

The third ranking factor was '**Supervisor's positive feedback after successfully completing a task'.** Looking carefully from the first to the third ranking factors it can be seen that the respondent do not consider financial incentives as 'strongly significant' motivating factor. This is consistent with findings in Rose and Manley (2011) which stated that there is no empirical evidence that financial incentive is a major motivating factor of the construction worker. In the paper it was concluded that finacial incentive alone is not enough drive to the construction worker. They further stated that, financial incentives is enhance in the mist of promoting a good project relationship and conditions. This factor is consistent with the second and the third ranking factors as well.

'Provision of Personal Protective Equipment' is ranked as the fourth factor. This is in agreement with Kim *et al*. (2016) which states that worker engagement would be achieved if the worker perceives commitment on the part of management.

Respondents also stated that it is significant for the supervisor is to understand the **'quality and technical details'.**

Running through from the fifth running factor to the eleventh all ranked critical factors are non-financial (Rose and Manley, 2011).

The 12th ranking factor which is '**Overtime observation and payment'** is the first financial incentive appearing in the table above. Other factors such as Job security (permanent employment) taking the 13th position, amount of salary ranked as the 14th and Provision of tools and equipment for task, accommodation, medical care follow in their respective order as shown in the table.

Finally, the last three ranking factors were 'Amount of freedom in your work'**,** 'Challenging task' and 'Opportunity for challenging work' respectively.

4.4. FREQUENTLY OCCURING UNSAFE BAHAVIOUR

To determine frequently occurring unsafe behaviour, respondents were required to indicate how often the variables identified occurred on their various construction sites. A five-point Likert scale was provided representing the following; 'Never' = **1, '**Rarely' = **2,** 'Fairly often' = **3** 'Often'= **4** 'Very often' = **5.**

In table 4.6, descriptive analyses consisting of the computed standard deviation and mean scores of the respondents from the highest mean to the lowest are represented. The researcher identified 13 frequently occurring unsafe behaviours from literature review. The mean scores obtained

were used in the table to rank variables in order of most frequently occurring unsafe behaviour to the least on the various construction site.

Table 4.6: Frequently Occurring Unsafe Bahaviour on Construction Sites

Variable	Rating					Mean	SD	Rank
	1	2	3	4	5			
Not using fall protection and restrain equipment	**14**	**14**	**6**	**6**	**10**	2.68	1.504	1st
Using short cuts and cutting corners to save time	**15**	**12**	**10**	**5**	**8**	2.58	1.43	2nd
Poor housekeeping	**13**	**17**	**8**	**6**	**6**	2.5	1.329	3rd
Working when fatigued	**11**	**17**	**12**	**9**	**1**	2.44	1.091	4th
Non certification of Scaffolding be used to access heights	**20**	**8**	**11**	**5**	**6**	2.38	1.413	5th
Not wearing Personal Protective Equipment	**17**	**13**	**8**	**9**	**3**	2.36	1.29	6th
Lack of attention and concentration on the job	**16**	**16**	**6**	**9**	**3**	2.34	1.272	7th
Distractive behaviour at height	**17**	**20**	**4**	**7**	**2**	2.14	1.161	8th
Taking chances	**16**	**16**	**14**	**3**	**1**	2.14	1.01	9th
Use of unsuitable access or failure to use right access	**19**	**15**	**12**	**3**	**1**	2.04	1.029	10th
Unsafe position or posture	**18**	**19**	**9**	**2**	**2**	2.02	1.04	11th
Improper stacking and storage of materials	**21**	**15**	**10**	**3**	**1**	1.96	1.029	12th
Working on electricity without isolation of power	**23**	**16**	**4**	**5**	**2**	1.94	1.15	13th

Source: Field Survey (2019)

From the table 4.6 above, the first ranked item was '**Not using fall protection and restrain equipment'.** During the field survey most respondents indicated that fall restrain equipment were not available on their sites. This situation is consistent with Jiang *et al*. (2014) which indicated that apart from individual factors physical conditions such as unavailable protevtive equipment influence the occurrence of unsafe behaviour. The second frequently occurring unsafe behaviour as represented by the results was **'Using short cuts and cutting corners to save time'**. The third frequently occurring unsafe behaviour was **'Poor housekeeping'.** The

researcher on most construction sites visited personally observed this situation. The fourth represented in the table was 'Working when fatigued' with most respondents choosing 'Rarely' and 'often'. From the table the fifth position was assigned to 'Non certification of Scaffolding be used to access heights'. The factor ranking sixth on the table was 'Not wearing Personal Protective Equipment'. 'Lack of attention and concentration on the job' ranked seventh, 'Distractive behaviour at height' ranked eighth, 'Taking chances' ranked ninth, 'Use of unsuitable access or failure to use right access' ranked tenth, 'Unsafe position or posture' ranked eleventh, 'Improper stacking and storage of materials' ranked twelfth. The least ranked frequently occurring unsafe behaviour was 'working on electricity without isolation of power' with 23 out of 50 respondents choosing 'Never'. From the researcher's observation, virtually all construction sites visited were at initial stages, which did not require the use of electricity in the working areas. This confirms the rating of this variable.

4.5. IMPACT OF MOTIVATION AND UNSAFE BEHAVIOUR ON CONSTRUCTION SITES.

4.5.1. Model Estimation and Results Evaluation

The study employed partial least square structural equation modeling (PLS-SEM) to estimate the relationship between motivation and unsafe behaviour on construction sites. The path modeling and parameter estimation analyses were performed using SmartPLS 3.0. The estimation of the relationships between motivation and unsafe behaviour on construction sites was first modeled to assess reliability and validity under measurement model evaluation. There were two constructs; motivational factors with 27 indicators using five-point Likert scale; 1=strongly not significant, 2=not significant, 3=average, 4= significant and 5=strongly significant and the second construct was unsafe behaviour with 13 constructs measured with five-point Likert scale; 1=never,

2=rarely, 3=farely often, 4=often and 5=very often. Measurement model was assessed before structural model evaluation following the approach of Hair *et al*. (2013a, 2011, 2012a,b,c) and Chin (2010).

4.5.2. Measurement Model Evaluation

Analysis using structural equation modeling required the assessment of the model and then the structural model assessment. The measurement model was assessed for the reliability and validity of the constructs. Internal consistency (composite reliability) and indicator reliability were the measures used to assess the reliability of the model. And the convergent validity (average variance extracted) and discriminant validity were the tools for measuring the validity of the model. Table 4.7 presented the initial assessment which pooled all the indicators into the model. The factor loadings with t-values, Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE). The Cronbach's alpha values and composite reliability were high indicating internal consistency. However, some of the factor loadings (Outer loadings) were below the conventional cut-off 0.70. Again, the average variance extracted for both constructs were low (< 0.50). Henseler and Sinkovics (2009); Gotz and Krafft (2010) suggested that low factor loading be dropped taking into consideration the effect on the composite reliability value.

Table 4.7: Measurement Model Assessment (Initial)

Indicators	Factor	t-value	CA	CR	AVE
MF1	0.129	0.338			
MF10	0.589	1.942			
MF11	0.723	2.201			
MF12	0.504	1.396			
MF13	0.391	1.146			
MF14	0.594	1.871			
MF15	0.459	1.386			
MF16	0.551	1.676			
MF17	0.397	1.409			
MF18	0.725	2.18			
MF19	0.505	1.461			
MF2	0.333	1.001			
MF20	0.406	1.475			
MF21	0.521	1.733	0.923	0.909	0.284
MF22	0.709	2.284			
MF23	0.373	1.052			
MF24	0.499	1.607			
MF25	0.581	1.915			
MF26	0.484	1.473			
MF27	0.524	1.678			
MF3	0.472	1.338			
MF4	0.567	1.618			
MF5	0.373	1.002			
MF6	0.423	1.139			
MF7	0.773	2.214			
MF8	0.729	1.734			
MF9	0.539	1.882			
UB1	0.645	2.303			
UB10	0.628	1.889			
UB11	0.458	1.507			
UB12	0.775	2.617			
UB13	0.562	2.126			
UB2	0.461	1.709	0.813	0.85	0.317
UB3	0.249	0.768			
UB4	0.516	1.699			
UB5	0.692	2.207			
UB6	0.424	1.192			
UB7	0.464	1.926			
UB8	0.501	1.757			

UB9	0.723	1.828

Measurement Model Assessment

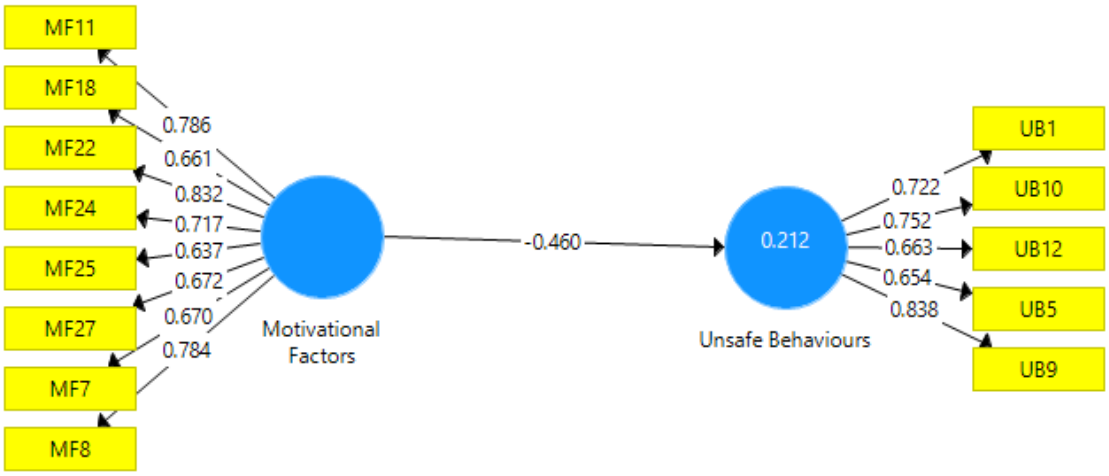

Figure 4.1: Path Diagram (Final Model)

Table 4.8: Measurement Model Assessment (Final)

	Factor	t-value	p-value	CA	CR	AVE
MF11	0.786	4.232	0.000			
MF18	0.661	2.992	0.003			
MF22	0.832	4.164	0.000			
MF24	0.717	3.024	0.003	0.877	0.897	0.523
MF25	0.637	3.087	0.002			
MF27	0.672	2.795	0.005			
MF7	0.670	3.144	0.002			
MF8	0.784	3.652	0.000			
UB1	0.722	4.082	0.000			
UB10	0.752	4.574	0.000			
UB12	0.663	3.323	0.001	0.790	0.849	0.531
UB5	0.654	3.340	0.001			
UB9	0.834	4.885	0.000			

CA: Cronbach's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted

Source: Field Study (2019)

The final model diagnosis reported in Table 4.8 with 8 indicators for motivational factors and 5 indicators for unsafe behaviour. The achieved composite reliabilities for the reflective measurement model were high 0.897 and 0.849 respectively for motivational factor and unsafe

behaviour highly supporting construct internal consistency reliability. The values of AVE were higher for both constructs, greater than the conventional point of 0.50(50%). This supported the measures of convergent validity of the model.

Based on the final iteration of the model, discriminant validity of the constructs was examined using the indicators' cross loadings, the comparison of AVE with the construct's correlation coefficients and Heterotrait-Monotrait Ratio. It was revealed that, the three discriminant measures exhibited discriminant validity (Table 4.9). The measurement evaluation was guaranteed proceedings to assess the structural model evaluation to establish the relationship between the two constructs.

Table 4.9: Discriminant Validity

	MF	**UB**	**Heterotrait-Monotrait Ratio**
MF	0.723		0.423
UB	0.460	0.729	

Source: Field Study (2019)

Table 4.10: Cross Loadings

	MF	**UB**
MF11	**0.786**	0.425
MF18	**0.661**	0.183
MF22	**0.832**	0.318
MF24	**0.717**	0.200
MF25	**0.637**	0.083
MF27	**0.672**	0.212
MF7	**0.670**	0.257
MF8	**0.784**	0.535
UB1	0.311	**0.722**
UB10	0.250	**0.752**
UB12	0.207	**0.663**
UB5	0.222	**0.654**
UB9	0.518	**0.838**

Source: Field Study (2019)

4.5.3. Structural Model Evaluation

This section of the evaluation sought to establish the relationship between motivation and unsafe behaviour on construction sites after successful measurement model assessment. From Table 4.11 the path coefficient was -0.460 with t-value of 2.032 and p-value of 0.042 < 0.05. These statistical values showed there was significant negative relationship between motivational factors and unsafe behaviour on construction sites. The relationship was statistically significant, p-value < 0.05.

Table 4.11: Structural Model Assessment

R-square	**0.212**		**R-square Adjusted**	**0.195**	
Hypothesed	Path Coefficient	t-value	p-value	CI	Decision
Motivational Factors → Unsafe Behaviour	-0.460	2.032	0.042	[-0.526, 0.691]	Significant

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1. INTRODUCTION

This chapter highlights summary of findings, recommendations and suggestions for further studies. The study sought to determine the relationship between motivation and unsafe behaviour on construction sites by determining three main objectives, which includes;

1. Determine critical motivation factors
2. Determine frequently occurring unsafe behaviour
3. Determine impact of motivation on unsafe behaviour

The study adopted the use of survey questionnaire to collect data from operatives on 8 construction sites in the Kumasi Metropolis. A sample size of 50 was obtained with purposive and convenience sampling for the study. Analyses of data obtained has been extensively discussed in the preceding chapter. Conclusions and recommendations are however made based on these findings.

5.2. SUMMARY OF FINDINGS

All three objectives of the empirical study were achieved. To allow better representation of each objective, each is outlined and summarized below;

5.2.1. Objective 1: To determine critical motivation factors

To satisfy this objective, respondents were required to rate critical motivational factors outlined according to their order of significance represented on a five-point Likert scale. From the data analysis, the first five factors ranked as important out of 27 factors were ‘Opportunity to develop skills and abilities’, ‘Respect received from co-workers and supervisors’, ‘Supervisor’s feedback

after successfully completing a task', provision of Personal Protective Equipment, 'Supervisor's Understanding of quality and technical details'. These factors obtained a higher mean score representing that respondents agree that these factors range from 'significant' to 'Strongly significant' as indicated on the 5 point Likert Scale.

These factors agrees with Rose and Manley (2011) which concluded in their research that the effectiveness of financial incentive is achieved on building an interactive and conducive project site.

5.2.2. Objective 2: To determine frequently occurring unsafe behaviour.

To realize the above stated objective, a thorough literature review provided frequently occurring unsafe behaviour based on previous studies. Respondents were required to rate these variables based on how often they occurred. From the analysis it was discovered that the frequently occurring unsafe behaviour were (Ranking 1^{st} to 5^{Th}) 'Not using protection and restrain equipment', 'Using short cuts and cutting corners to save time', 'Poor housekeeping', 'Working when fatigued', 'Non certification of Scaffolding be used to access heights'. Studying the overall mean score of the results, we can infer that the frequency of occurrence is at a relatively average rate considering the highest mean of '2.68'

5.2.3. Objective 3: To determine impact of motivation on unsafe behaviour

To achieve the above objective, the study employed partial least square structural equation modeling (PLS-SEM) to estimate the relationship between motivation and unsafe behaviour on construction sites. Considering the sample size, the path modeling and parameter estimation analyses were performed using SmartPLS 3.0.

The results show that there is a significant negative impact of motivational factors on occurrence of unsafe behaviours. The relationship was statistically significant, represented by 'p-value <

0.05'. This further shows that a slight change in a unit of motivational factors will lead to a larger reduction in the occurrence of unsafe behaviour.

5.3. CONCLUSIONS

Critically assessing the motivation factors of the construction operative reveals that motivation varies from one person to the other. Seeing that the construction industry is dynamic in terms of employing people from different backgrounds and trades it is of importance that construction managers determine what satisfy their work force to perform safely on the task (Dainty and Asad, 2005; Ghoddousi *et al*., 2014). From the empirical data collected, it can be concluded that operatives consider personal development and building good relationship as more significant. However, ensuring good project conditions coupled with a good financial incentive would ultimately motivate the worker

The Data collected indicated ongoing unsafe behaviour on Ghanaian construction sites. Although results show a lower rate of frequency, it is imperative to slightly improve motivation of employees to achieve optimum safety on Ghanaian construction sites.

5.4. LIMITATIONS OF THE STUDY

The study encountered the following limitations;

i. Most respondents could not complete questionnaire without assistance due to inability to read the English language. The researcher was required to explain questionnaire in the local language. This could prevent respondents from expressing their views objectively**.** Furthermore, it was difficult to reach a larger number of respondents since operatives were only released to partake in the study during lunchtime.

ii. Limited time factor was a major constraint to retrieving data from the target population of this research study**.**

5.5. RECOMMENDATIONS

It can be deduced from the entire study that achieving an improved construction site is dependent on modifications made on motivational factors. Hence, all recommendations would be targeted at improving motivation to influence positive site safety. Under this section, recommendations are grouped into 'Recommendation for the construction industry' and 'Recommendations for further research'.

5.5.1. For the construction industry;

i. **Training and development schemes for construction site operatives:** Some respondents in giving their background information stated that they obtained their current skills on the job training. Most respondents came into the construction industry unskilled. However, over the years most acquired skills like tiling, carpentry, block laying etc. This assertion is consistent with the highest ranked motivation factor. It is recommended that construction mangers provide opportunities for unskilled workers to acquire skill and provide development avenues for skilled workers as well.

ii. **Fostering good interpersonal relationship amongst all the players in the construction industry:** This can be enhanced through mutual respect and development of good communication skills among management and subordinates. This also involves giving positive feedback to encourage the worker to deliver at his best. It promotes a high sense of belonging hence each person serves as his 'brother's keeper.

iii. **Development and Implementation of company Safety policy:** It is recommended that construction companies obtain their own safety policies. This would significantly improve

site safety if the contractor demonstrate commitment to those policies by creating the environment and providing all equipment needed to carry out task safely.

iv. **Improvement in Financial Incentive**: Even though many research findings have agreed that financial incentives in isolation is not a high level of motivation for the construction worker. In a developing country where the value of money is constantly depreciating the significance of money as a motivator increases (Ghoddousi *et al*., 2014). This is evidence in the higher mean obtained in results analyses. However, an improved financial motivation in addition to critical motivation factors would enhance productivity and safety.

5.5.2. For Further Studies

Below are recommendations for further studies

i. It is recommended that further research be replicated out on a larger sample size to ascertain the relationship between motivation factors and unsafe behaviours.
ii. Specifically doing this research in other regions (districts, municipal assemblies, and metropolis) would present a conclusive relationship between critical motivation and unsafe behaviour nationwide
iii. This study was undertaken in D1/K1 and D2/K2 construction companies who are considered to have a relatively higher financial standing. However, it is recommended that this study is carried out in D3/K3 and D4/D3 contractors to ascertain the views of workers in lower ranking companies.

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APPENDIX

QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF ART AND BUILT ENVIRONMENT

FACULTY OF BUILT ENVIRONMENT

DEPARTMENT OF CONSTRUCTION TECHNOLOGY AND MANAGEMENT

SURVEY QUESTIONNAIRE

AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN MOTIVATION AND UNSAFE BEHAVIOUR ON CONSTRUCTION SITES

Dear Sir/Madam,

Miss Martha Gbadadgo a postgraduate student in Construction Management is undertaking this research. This questionnaire forms part of an MSc. research project which aims to determine the relationship between motivation and unsafe behaviour on construction sites. It is expected that this research will help to improve safety on construction sites.

Completion of the questionnaire is voluntary and returning a completed questionnaire would be considered as your consent to participate in this research survey. The questionnaire would take you about 5 minutes to complete.

Providing accurate information would be relevant to the validity of this study. All data held are purely for research purposes and are strictly confidential.

In the event of questions or queries, please do not hesitate to contact us. Thank you for your time and valid contribution in advance.

Yours Faithfully,

……. SUPERVISOR

Martha Gbadago Dr. Emmanuel Adinyira

martgbad@gmail.com

Mobile: 0545583867

PART A: BACKGROUND INFORMATION OF RESPONDENT

Please provide answers by ticking the right box

1. What is your position or role in this company?
   Mason [ ] Carpenter [ ] Steel Bender [ ] Operator [ ]
   Helper [ ] Electrician [ ] Painter [ ]

   Other Specify……

2. What is your level of education?
   HND [ ] NVTI [ ] SHS [ ] JHS [ ]
   Other Specify……

3. How long have you been in practice?
   0-5 years [ ] 6-10 years [ ] 11-20 years [ ] More than 20 [ ]

4. Please indicate your years of working with this firm
   < 6months [ ] 6months [ ] 1-2 years [ ] 3-5 years [ ] 5 years + [ ]

PART B: CRITICAL MOTIVATION FACTOR

Please indicate (with a tick [✓]), the significance of the following motivational factors using the Likert scale provided.

Strongly not significant =1 Not significant = 2 Average =3
Significant = 4 Strongly Significant=5

	Motivational Factors	**1**	**2**	**3**	**4**	**5**
5.	Amount of salary					
6.	Amount of freedom in your work					
7.	Bonus at the end of project or year (showing appreciation at the end of the project and year					
8.	Chance for getting a promotion					
9.	Opportunity for challenging work					
10.	Supervisor's positive feedback after successfully completing a task					
11.	Respect received from the co-workers & supervisor					
12.	Holidays and free time (lunch breaks) during work					
13.	Team to work with					
14.	Opportunities to develop skills and abilities					
15.	Type of physical surroundings (washrooms, canteen etc.)					
16.	Chances to do the things which you do best and like most					
17.	Chances to learn new things					
18.	Seeing the ultimate results of work					
19.	Provision of tools and equipment for task					
20.	Supervisor's understanding of the quality and technical details					
21.	Employee participation in decision making					
22.	Provision of Personal Protective Equipment					

23.	Overtime observation and payment					
24.	Job security (permanent employment)					
25.	Good relation with colleagues					
26.	Payment of Salary on time					
27.	Challenging task					
28.	Accommodation (Provision of physical accommodation or housing allowance)					
29.	Safety procedures in site					
30.	Transportation (Vehicle at your disposal, allowance for transportation, transportation from a location to site and back)					
31.	Medical care (Having a particular hospital to attend in case of illness or subsidising the cost of hospital bills)					

PART C: FREQUENTLY OCCURING UNSAFE BEHAVIOUR

Please indicate (with a tick [✓]), how often the following behaviour are experienced on your site using the Likert scale provided.

*Never = **1*** *Rarely = **2*** *Farely often = **3*** *Often = **4*** *Very Often = **5***

	Unsafe Behaviours	**1**	**2**	**3**	**4**	**5**
32.	Lack of attention and concentration on the job					
33.	Working when fatigued					
34.	Unsafe position or posture					
35.	Use of unsuitable access or failure to use right access					
36.	Not using fall protection and restrain equipment					
37.	Using short cuts and cutting corners to save time					
38.	Taking chances					
39.	Non certification of Scaffolding be used to access heights					
40.	Poor housekeeping					
41.	Not wearing Personal Protective Equipment					
42.	Working on electricity without isolation of power					
43.	Distractive behaviour at height					
44.	Improper stacking and storage of materials					