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Original Article

A Strategy for Effective Safety Management in Construction Sites in Kenya

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Safety, Strategy, Hazardous, Injury, Fatality

ABSTRACT

While the construction industry is the driving force in economic advancement and job creation, in developing countries, it is one of the most hazardous industries of all sectors, as measured by injury and fatality rates. The purpose of this study was to establish strategy for effective safety management in construction sites in Kenya. The research design for this study was cross-sectional design. The target population, was the National Construction Authority (NCA) contractors under categories 1-8 operating within Nairobi. Data was collected through surveys and interviews focusing on identifying and measuring variables for descriptive or explanatory purposes. Low level of safety management on construction sites in Kenya was attributed to lack of efficient safety programs at 87%, 76% lacked commitment to safety at all organization levels, 79% alluded to a poor safety culture and climate at work, whilst 75% exhibited inadequate compliance to safety laws. 92% had inadequate safety policies, poor safety training accounted for 92%, improper issuance and monitoring the use of PPE was at 72%, 64% had non-functional accident and incident reporting systems, 99% noted that workers' experience reduced the number of injuries, there was a decreased ability to avoid unexpected accidents. 92% lacked measures to ensure monitoring of the scale, nature, and distribution of hazards and 88% had inefficient operational procedures to ensure safety of workers. The factors led to a 64% change in the level of safety management on construction sites. A strategy for effective safety management on construction sites in Kenya was consequently developed in order of ranking of factors that influenced safety.

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INTRODUCTION

The construction industry is broadly perceived as the driving force in economic growth and job creation, in developed and developing countries (Ng'ang'a et. al, 2013). However, it is portrayed as one of the most dangerous industries of all sectors, as measured by injury and fatality rates. According to the Ministry of Housing and Urban-Rural Development of the Republic of China (MOHURD), from 2011 to 2017, there were 4766 fatalities in the construction industry, with an average of 1.87 deaths per day. In November 2018, the statistics as per the Accident List exposed that there were 712 accidents and 798 deaths (Zhang et. al, 2020). According to the Census of Fatal Occupational Injuries (CFOI), catastrophic construction injuries in the United States accounted for approximately 18% of all occupational deaths in 2014. A novel study by Institution of Engineers of Kenya (IEK) exposed that Kenya suffers about 64 fatalities per 100,000 employees each year (Kemei et al., 2015). Demand for safe working conditions for workers has continued to grow, driven by estimates like these (ILO, 2017). Many advanced economies have made substantial improvements in safety management owing to the use of systems, structures, and contemporary technology, but have found it difficult to achieve steady improvements in safety performance (Zou et al., 2015). More of the same will not lead to the next big hop in safety performance (Wagner, 2010). Developing a strategy for safety management from a strategic standpoint will perhaps be cardinal in enhancing the level of safety management on construction sites.

It is a way to attain the level of integration integral in eliminating and mitigating safety risks, and to achieve the hungered for safety cultural maturity. (Zou et al., (2015) argues that safety ought to be implemented not only for the sake of complying with legal obligations, but as a value-added business blended into the overall corporate strategic management and I utterly support this assertion. For this reason, the core of this study capitalized on strategic resolutions made by the boardroom and senior management. It communicates the relevance of balancing and intermingling the 'science' and 'art' of safety management, conjointly with an exploration of how safety is apprehended and enacted by top management and on-site operatives. This meant that safety was to be looked at extensively from a strategic decision-making and management standpoint making most of strategic opinions made by management, whilst encircling safety strategy development, implementation and evaluation.

METHODOLOGY

The design for this research was cross-sectional survey. The target population, was the National Construction Authority (NCA) contractors under categories 1-8 registered and operating within Nairobi. According to NCA (2023, May 24) database, there were a total of 58,034 contractors registered under NCA categories 1-8 within Nairobi. This was further divided into 8 strata based on the category within which they fell: S1 = 902; S2= 670; S3 = 864; S4= 2,682; S5 = 7,174; S6=12,647; S7 = 11,982; S8 = 21,113. From these, samples were selected in appropriate proportions to form the sample set of 100. So, the sum of samples obtained from each stratum were given in the following equation as advanced by (Bairagi & Munot, 2019):

$$SSi = n^* (Si / P)$$

Where SSi represented the sum of samples from the "i"th strata selected; n* the count of sample set. Si was the sum of samples existing in the "i"th strata and P the population. Applying the formulae above: SS1 = 100 (902 /58,034) = 2; SS2 = 100

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(670 / 58,034) = 1; SS3 = 100 (864 /58,034) = 1; SS4 = 100 (2,682 /58,034) = 5; SS5 = 100 (7,174 /58,034) = 12; SS6 = 100 (12,647 /58,034) = 22; SS7 =100 (11,982 /58,034) = 21; SS8= 100 (21,113 /58,034) = 36. Therefore, the samples designated from each stratum were 2,1,1,5,12,22,21 and 36 respectively, forming n = 100 contractors.

Data was collected through survey questionnaires. The questionnaires focused on identifying and measuring variables for descriptive or explanatory purposes. A pilot survey was conducted for testing the questionnaires. 94 responses were obtained, indicating a response rate of 89%. Based on Babbie's (2018) suggestion that any return rate over 50% can be reported and that over 70% is excellent; a return rate of 89% was statistically adequate to represent the whole. A casual analysis approach (*Charles Spearman ranking of factors by correlation coefficients)* studying how the independent variables (*Factors affecting the level of safety management*) affected change in the dependent determinant (*The level of safety management on construction sites in Kenya*) was thereafter applied to determine the relationship between the two.

Charles Spearman's Coefficient of Correlation was used to establish the strength of the association between the factors influencing the level of safety management and the level of safety management on construction sites in Kenya. The responses from factors were presented in a Likert scale, where ranks were given to the different values of the variables. The coefficient was determined as using the formula:

$$r_s = 1 - \left[\frac{6\Sigma\, d_i^2}{n(n^2-1)}\right]$$

Where: d_i = difference between ranks of *i* th pair of the two variables; n = number of pairs of observations. r_s = Spearman's coefficient of correlation.

Comparing the correlation coefficients of the factors to the level of safety, provided the possibility of ranking the 8 main factors. These ranks in order of importance are shown in *Table 1*. The relationship (correlation) between the two determinants was represented by the letter r and quantified with a number, which varies between −1 and +1. Zero meant there was no correlation, and 1 meant a complete or perfect correlation. The sign of the r showed the direction of the correlation.

RESULTS & DISCUSSION

The Level of Safety Management in Construction Sites in Kenya

Establishment of a Health and Safety Program

87% (77) did not have an elaborate safety program. The one in use, did not provide direction regarding how to handle present hazards and offered no direction regarding safety future projects. Given that only 13% adopted an efficient safety program, makes ineffective the Directorate of Occupation Safety and Health Services (DOSHS) vision, "A healthy worker in a safe work environment". An efficient safety program is one which is deemed to provide a clear perspective regarding how to handle both the present and future hazards, and offers a sense of direction regarding the future of safety management for future projects and a set of criteria against which actual organizational performance could be measured.

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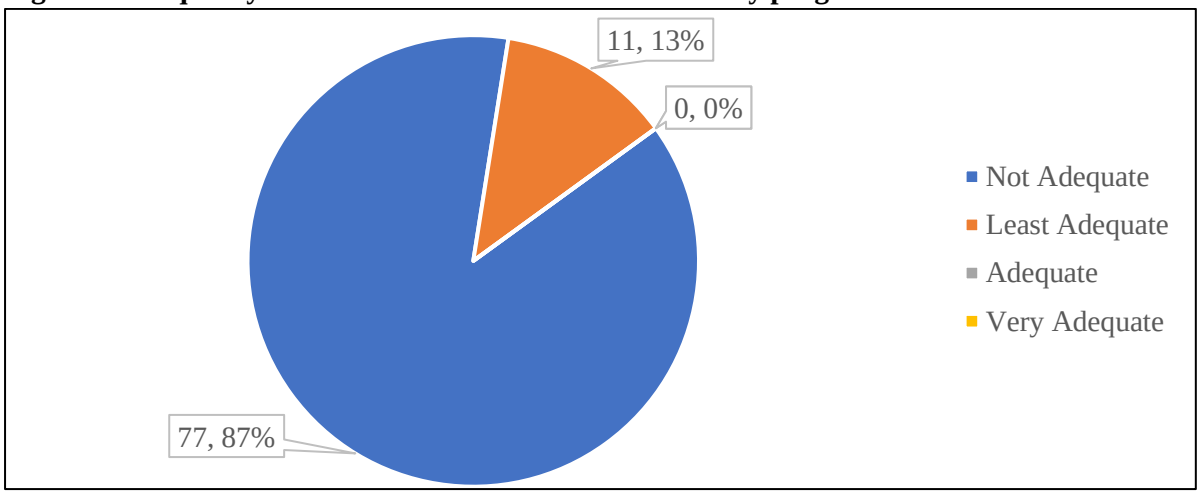
Figure 1: Frequency distribution of establishment of a safety program

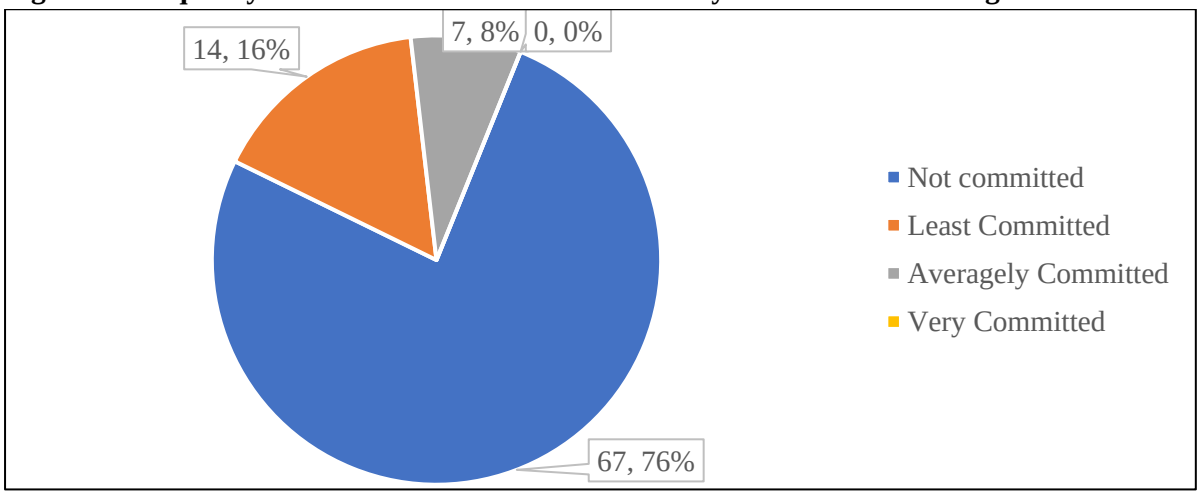


Source Author (2023)

Commitment to Safety at All Levels of the Organization

76% of the respondents lacked commitment to safety at all levels of the organization. They were found to be incognisant of the fact that high standards of safety were achievable as part of a long-term strategy formulated by the company. 16% who were least committed, demonstrated commitment to safety management throughout all levels of the organization and acceptance that high standards.

Figure 2: Frequency distribution of commitment to safety at all levels of the organization



Source: Author (2023)

of safety were achievable as part of a long-term strategy formulated by the company while 8% were averagely committed to safety throughout and at all levels of the organization. Comparing these findings with Ogeti's (2019) study, where it was established that only 7.8% of the workers participated fully in upholding safety measures established by management on site, both studies observed that high odds of small extent mediation of workers on implementation of safety issues was due to the fact that 92% of the sites did not have safety committees which actively involved employees in matters of occupational safety.

Employee's Attitudes and Insights Towards Safety at the Workplace

A larger percentage of the population (48%) were not interested. Workers and supervisors were more interested in getting their jobs done than their working environment. 31% were least interested; rating their working conditions as good

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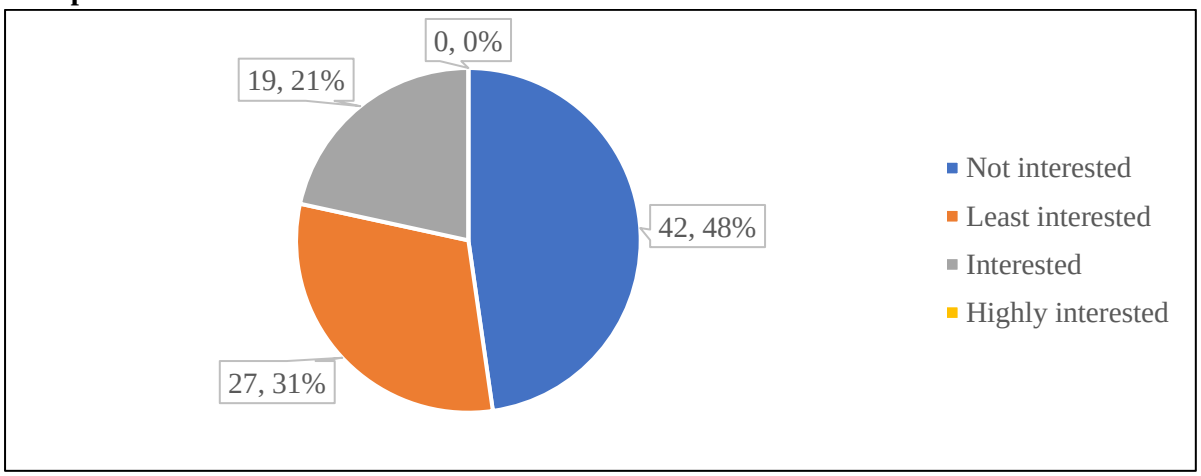
because they had adapted to them and recognized them as unavoidable even if they were deplorable.

21% were interested holding the opinion that the top-level managers in their firms considered safety as important as the other aspects in the organization. However, workers were not involved in the process of creating safety regulations. Juxtaposing these results with Nyaruai (2019) study, it was evident that construction workers were more interested in getting the jobs than their working environment.

Figure 3: Frequency distribution of employee's attitudes and insights towards safety at the workplace



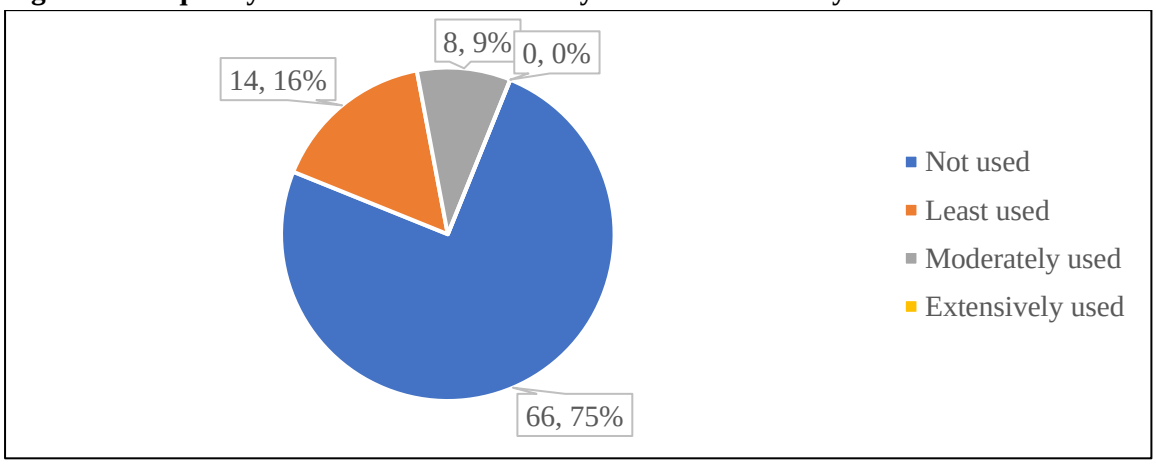
Source: Author (2023)

These results corresponded with Mitulla and Wachira (2003) findings, that workers endure poor safety conditions of work simply because they had been in the construction industry for long and hence had conformed to the conditions and recognized them as unavoidable.

Compliance to Safety Laws & Regulations (OSHA & WIBA)

75% did not use OSHA and WIBA laws which meant that they were not aware of existence of safety laws and neither referred to them during formulation of safety policies at work. 16% least used them meaning they knew of the existence of these laws and used them to attain safety, of people at work, and to guard those not at work from dangers to their safety emanating from people's activities at work.

Figure 4: Frequency distribution of conformity to health and safety laws



Source: Author (2023)

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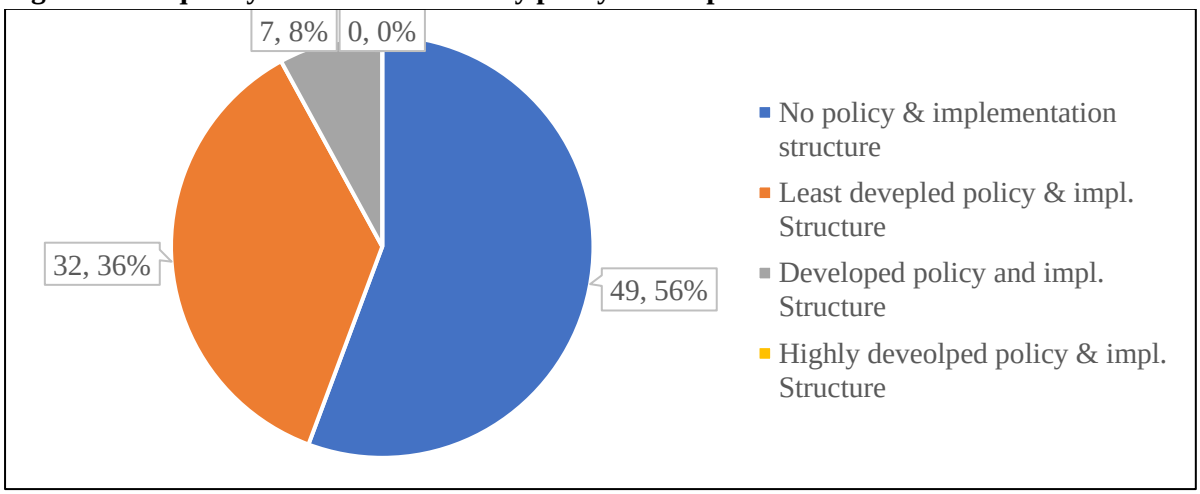
9% of contractors moderately used these laws for the purpose with which they were formulated which is "Attaining safety of people at work, and guarding those not at work from dangers to their safety emanating from people's activities at work as well as compensation to employees for injuries contracted during employment." Such deficiency in compliance to safety laws and regulations tallies with the Ministry of Labour (2012), report which insists on the law not being precise on the initiation of safety management systems at the enterprise level. Besides, contractor's lack of awareness on existence of safety laws is largely attributed to the DOSHS offering OSH services in 29 of the 47 counties which is only 62% of contractors nationwide, based on the Ministry of Labour report published in 2012.

Factors Influencing the Level of Safety Management in Construction Sites in Kenya

Safety Policy and Implementation Structure

56% of contractors had no safety policy whose implication was that safety management was largely based on human intuition on what was safe and unsafe practices during construction. 36% had a safety policy and a structure for implementation of safety at work only, while 8% had a safety policy and a structure for implementation of safety at work as well as proactive training based on the established policy to equip personnel with knowledge to work safely and without risk to health.

Figure 5: Frequency distribution of safety policy and implementation structure



Source: Author (2023)

None of the respondents (0%), had a highly developed safety policy and a structure for its implementation at work; one which provides proactive training to equip personnel with knowledge to work safely as well as safety committees to investigate and evaluate job related and potential hazards and periodically develop customized safety procedures to the hazards encountered. The entire sample upon which the questionnaire was administered suggest the reason behind this circumstance being unwillingness to invest in safety, a factor ranked highest in Kemei & Nyerere's (2015) study on management factors leading to construction accidents in Nairobi County.

Safety Training

No respondent (0%) conducted excellent and quality training. Such training ought to have been conducted at specific times apart from morning parades to intensively train construction workers and supervisors to work safely, based on training needs analysis, specific objectives from training needs and an evaluation of the efficacy of such training conducted thereafter and remedial measures taken. 57% did not conduct training. 35%, poorly conducted training. Training was conducted at specific times including and apart from morning parades to train

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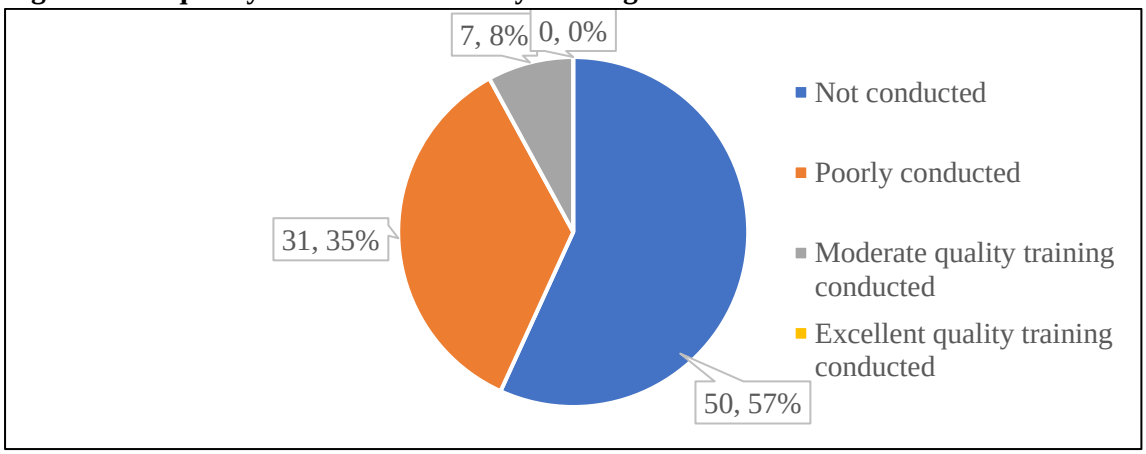
Figure 6: Frequency distribution of safety training



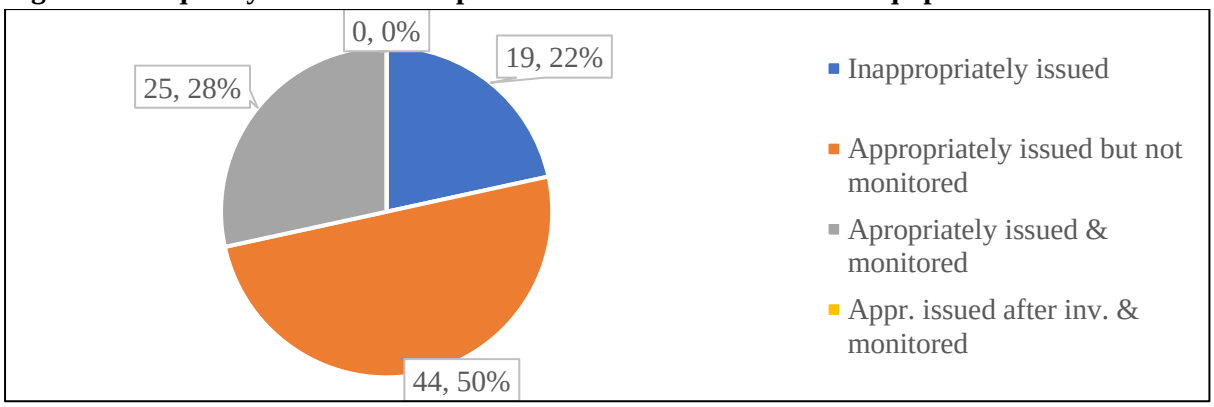
Source: Author (2023)

construction workers to work safely but no training needs analysis was conducted. 8% conducted moderate quality training. Such training was based on training needs analysis, specific objectives from training needs although no evaluation of the efficacy of this training was done. All these findings correspond to Kemei et al.'s (2015) study; that the motivation to learn on matters safety was low principally because Kenya has very few qualified safety trainers.

Provision of Personal Protective Equipment (PPE)

22% inappropriately issued PPE, meaning they issued the same PPE to all construction workers irrespective of the task they were supposed to undertake. 28%, appropriately issued and monitored PPE in such a way that they provided suitable PPE as a last resort where engineering control methods were not feasible; after conducting PPE risk assessment; establishing steps to ensure adequate supply of PPE; and had a procedure to ensure the proper use, maintenance and storage of the issued PPE. A larger distribution 50%, none the less, issued appropriate PPE based on the hazards the worker was possibly exposed to but did not monitor as to how they properly use them. Based on Occupational Safety and Health Branch Labour Department, OSHBLD (2002) from which the best practice regarding use of PPE was derived; effective provision and use of PPE necessitates establishment of a programme to identify hazardous exposure to the workers and to provide suitable PPE as a final resort where engineering control methods were not feasible and made deliberate efforts to take steps to ensure adequate supply of PPE, including replacement supply and spare parts, monitoring to ensure the proper use, maintenance and storage of such PPE a level which none of the respondents (0%) achieved.

Figure 7: Frequency distribution of provision of Personal Protective Equipment



Source: Author (2023)

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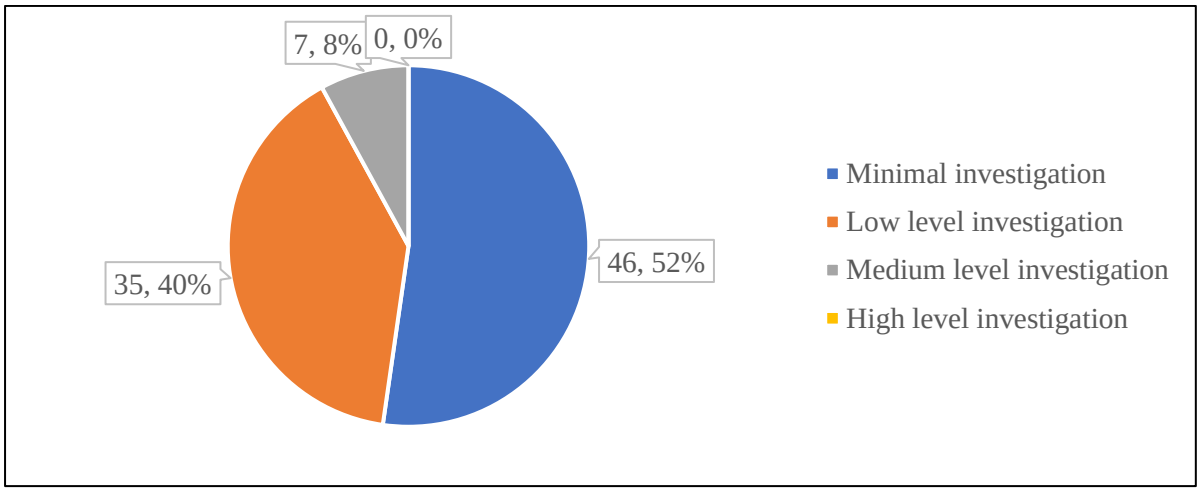
Investigation into Accidents and Incidences During Construction

52% of contractors conducted minimal investigation into accidents and incidences during construction. Such investigation entailed the relevant supervisor exploring circumstances of the accident or incident and tried to learn lessons which would prevent future incidents. 8%) conducted medium level investigation in which the relevant supervisor conducted a detailed investigation to look for the immediate, underlying and root causes of the accident/incident. 40% of the respondents conducted a type of investigation in which the relevant supervisor investigated into the underlying and root causes of the accident/incident, to try to prevent a recurrence and to learn general lessons.

Figure 8: Frequency distribution of investigation into accidents and incidences during construction.



Source: Author (2023)

No contractor (0%), conducted high level investigation as prescribed by the OSHBLD (2002). Such an investigation ought to have been a team-based investigation, involving supervisors, safety advisers and employee representatives under the supervision of senior management to identify the immediate, underlying and root causes into such accidents or incidents.

System of Reporting and Recording Incidents and Accidents

5% of contractors had a fully functional system that provided for reporting, of all appropriate records of accidents and incidents as well as provided for routine analysis of events to check for trends in performance and the prevalence of types of incidents or injury as prescribed by the OSHBLD (2002). Likewise, 31% had a system that could be defined as partially functional, in that it only provided for reporting of all appropriate records of accidents and incidents but no routine analysis of events to check for trends in performance and the prevalence of types of incidents or injury. 28% and 36% respectively, did not have such a system in place or had a least functional system that was limited to only provide for reporting, but not of all appropriate records of accidents and incidents.

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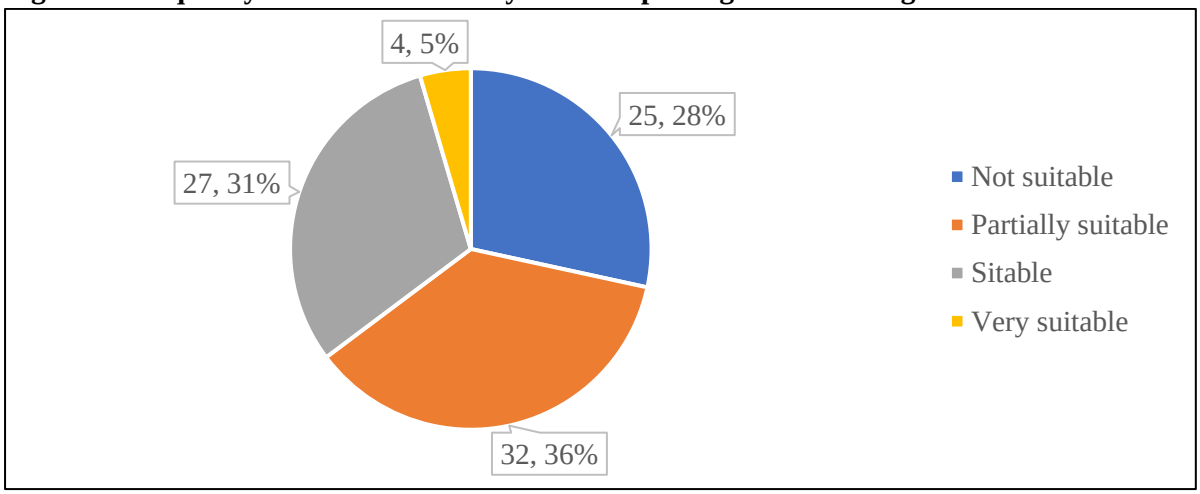
Figure 9: Frequency distribution of the system of reporting and recording incidents and accidents

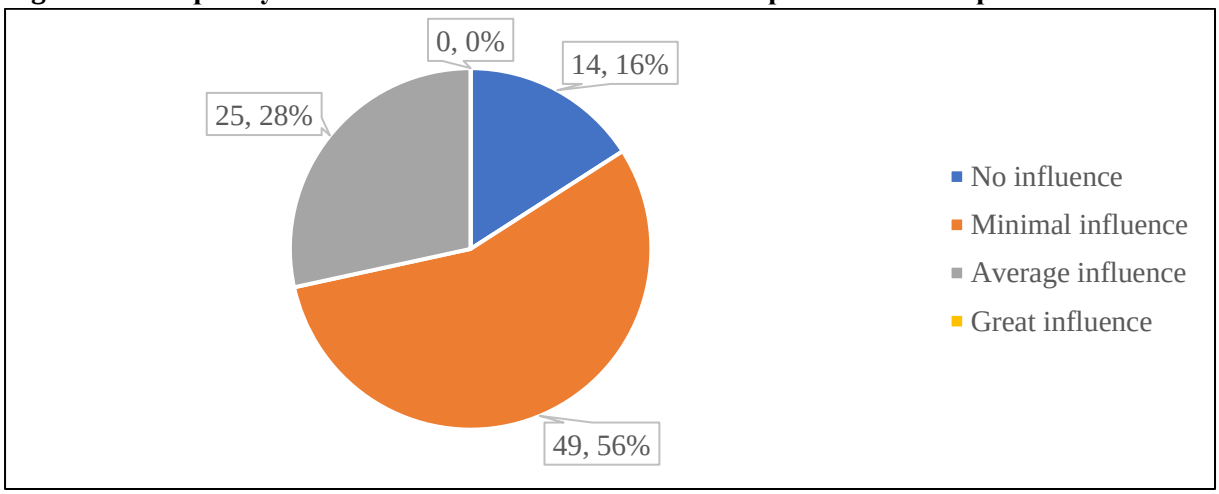


Source: Author (2023)

Influence of Worker's Experience on Occupational Accidents

None (0%) of the respondents preferred an inexperienced construction worker since they perceived that this greatly influenced the prevalence occupational accidents. 16% still, preferred workers who were generally more experienced since they perceived them to have a greater concern for the risks related to their job which reduced the number of injuries suffered as well as severity. 56% preferred such workers since although this reduced the number of injuries suffered as well as severity, they noted that such workers had a decreased ability to avoid unexpected accidents. 28% noted that they had a decreased ability to avoid unexpected accidents because they exuded excessive confidence due to their experience which led them to disregard even the basic accident prevention measures. The respondents great concern for influence of worker's experience on occupational accidents as a factor of employment matches with Salminen (2004) conclusion that young workers (Under 25 years) are at a higher risk in nonfatal incidents whereas older workers are at a higher risk in fatal injury. Given that 16% did not consider worker's experience on prevalence of occupational accidents, 16% of construction workers are still predisposed to fatalities every year if corrective measures are not taken.

Figure 10: Frequency distribution of influence of worker's experience on occupational accidents.



Source: Author (2023)

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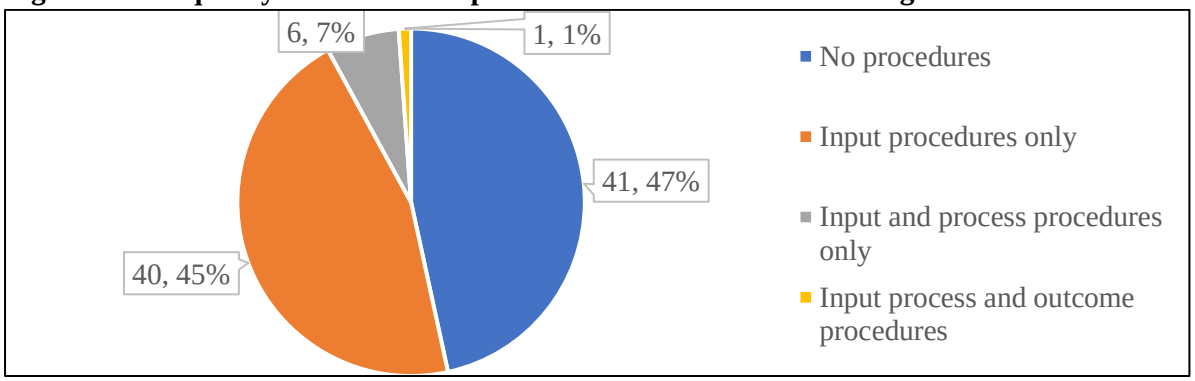
Procedures for Effective Monitoring of Hazards

47% had not put in place any measures to ensure effective monitoring of the scale, nature and distribution of hazards created by the organization's activities. 45% had put in place input measures only. Such measures, monitored the scale, nature and distribution of hazards created by the organization's activities. 7% adopted input and process measures only which assumed all input measures as well as active monitoring of the adequacy, development, implementation and deployment of the safety management system.

Figure 11: Frequency distribution of procedures for effective monitoring of hazards



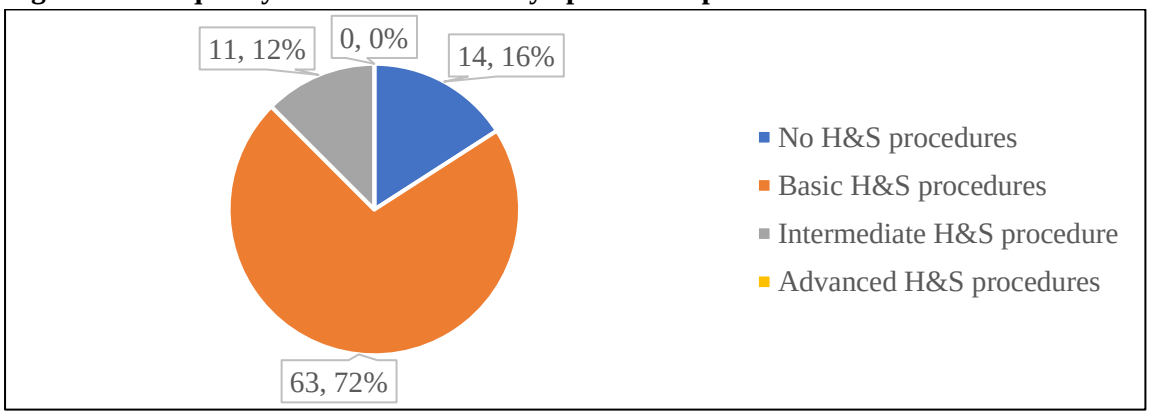
Source: Author (2023)

Only 1% embraced input, process and outcome measures as prescribed by OSHBLD (2002). Such measures appropriated all input and process measures as well as reactive monitoring of adverse outcomes resulting in injuries, ill-health, loss and accidents with the potential to cause injuries, ill-health or loss.

Safety Operational Procedures

72% had adopted basic safety procedures. Such firms had put in place measures to ensure a safe place of work, protection against falls and protection against falling objects. 12% assumed intermediate safety procedures in which the firms had put in place procedures to ensure safe place of work, protection against falls and protection against falling objects, safety during demolition and excavation as well as maintenance of vehicles and machines. Per contra, 16% had not put in place any operational procedures to ensure safety of workers. However, the best practice as stipulated by the OSHBLD (2002), necessitate that, effective operational procedures are those which ensure safe place of work, provide protection against falls and falling objects, falls and falling objects, guarantees safety during demolition and excavation, prioritizes maintenance of vehicles and machines, and offers protection against fire, other emergencies, electrical and chemical hazards.

Figure 12: Frequency distribution of safety operational procedures



Source: Author (2023)

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Ranking of Factors by Correlation Coefficients

The factors are ranked in a descending order beginning with the highest as: Inadequate safety training programs and ending with poor accident record keeping and reporting. A negative r meant that the variables were contrariwise related. The strength of the correlation increased both from 0 to +1, and 0 to −1. Inadequate safety training programs ranked highest, given that it exhibited perfect correlation (+1). Such a factor would then be highly prioritized in preparation of the strategy for safety in construction sites in Kenya.

Deficient organization commitment to safety, inadequate strict operational procedures, insufficient monitoring and compliance to safety measures, lack of proper investigation into incidents and accidents and the prevalence of types of incidents or injuries, poor accident record keeping and reporting and inadequate supply and use of PPE however exhibited a weak relationship (Values were below +0.3 and -0.3 tending towards 0 which means no relationship). Poor accident record keeping and reporting exhibited the least correlation amongst them all.

On the contrary, there exists a negative correlation between the level of safety on construction sites and poor accident record keeping and reporting (-0.087) as well as inadequate supply and use of PPE (-0.119). The negative correlation signified that as one variable increased, the other tended to decrease. For instance, the better accident and incident record keeping and reporting was done, the fewer the safety incidents and incidents would be observed.

Table 1: Ranking of factors affecting the level of safety on construction sites in Kenya

Factors affecting safety management in construction sites	Correlation Coefficient (r_s)	Ranking
Inadequate safety training programs.	1.000	1
Level of experience in construction by a worker.	0.826	2
Deficient organization commitment to safety.	0.196	3
Inadequate strict operational procedures.	0.138	4
Insufficient monitoring and compliance to safety measures.	0.058	5
Lack of proper investigation into incidents and accidents and the prevalence of types of incidents or injuries.	0.012	6
Inadequate supply and use of PPE.	-0.119	7
Poor accident record keeping and reporting.	-0.087	8

Source: Author (2023)

CONCLUSIONS

This study concludes that 87% of contractors required a strategy to provide direction on how to handle safety hazards and a set of criteria against which organizational safety performance could be measured. 92% of contractors could only be commitment to safety at all levels of the organization if a strategy in which safety committees could be utilized to proactively engage workers in matters of safety management could be devised for them. 79% of contractors were bereft of a strategy to hypnotize construction workers' interest in the state of safety at their workplace. As a result, workers shifted attention to getting their jobs done than unsafe working environment having been compelled to adapt to them as unavoidable. Furthermore, the law (OSHA 2007and WIBA 2007) did not provide a strategy of safety management at enterprise level. 75% of contractors were unaware of these pieces of legislation; a situation heightened by the DOSHS inability to extensively create awareness on existence of these laws.

No contractor (0%), considered the importance of investing in safety through developing a safety policy and a structure for implementation at work. As a consequence, there was no strategy to proactively conduct safety training to equip workers with knowledge to work safely as well as establishing safety committees mandated

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investigate and evaluate job related hazards to develop customized safety procedures. Notwithstanding, it was worth concluding that there was need to sensitize all contractors on a strategy for effective provision and use of suitable PPE as a final resort where engineering control methods were not feasible. There was also need to develop a strategy to investigate accidents and incidences during construction to identify the immediate, underlying and root causes into accidents or incidents with the aim of abating such occurrences.

Given that only 5% of contractors had a fully functional system of reporting and recording incidents and accidents draws the presumption that there was dire need to advance a strategy of reporting and recording incidents and accidents and to provide for routine analysis of events to check for trends in performance and the prevalence of types of incidents or injury experienced on construction sites. Additionally, 16% of construction workers were predisposed to fatalities every year if corrective measures are not taken with young workers (Under 25 years) at a higher risk in nonfatal incidents and older workers at a higher risk in fatal injuries. Ultimately, 88% of contractors were in an extreme necessity of a strategy for conducting safety operational procedures, to ensure a safe place of work, provide protection against falls and falling objects, guarantee safety during demolition and excavation, prioritize maintenance of vehicles and machines as well as protection against fire, other emergencies, electrical and chemical hazards.

Recommendations

Based on this study's findings and conclusions, the recommendations in *Table 2* were found vital in enhancing the level of safety management in construction sites in Kenya:

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Table 2: The strategy for effective safety management in construction sites in Kenya

Ranking	Factor	Recommended Management Strategy
1	Inadequate safety training programs.	Identify training needs The contractor shall let his workers know: Organizational training needs a) The organization's safety policy and the philosophy underlying it; b) The structure and systems for carrying out the policy. Job-related training needs Management needs: i) Techniques of safety management; ii) Knowledge of relevant legislation and appropriate methods of control including risk management; Knowledge of the organization's planning, measuring, and auditing or reviewing arrangements. Non-management needs: i) An overview of safety principles; ii) Detailed knowledge of the safety arrangements relevant to an individual's job; iii) Communication and problem-solving skills to encourage effective participation in safety and health activities. Individual training needs Individual needs shall generally be identified through performance appraisal. Such assessments shall cover: i) The induction courses for new starters, including part-time, temporary and imported workers; ii) The performance of long-term workers (especially those who may be involved in critical emergency procedures); iii) Job changes, and situations involving staff promotion or someone standing in for someone else; Formulation of training objectives and methods Based on job analysis and risk assessment, the contractor shall set objectives and priorities for training. These shall be used as the basis for measuring the effectiveness of training and for determining whether the workers have attained the desired level of proficiency. Conducting training programmes The contractor shall determine when and at what level training shall be conducted, having regard to the actual situations. However, in no case shall workers be made to shoulder the costs of training. Evaluation of the effectiveness of training Pre-testing shall be conducted to determine the needs for the programme; post-testing shall evaluate how much has been learned.
2	Deficient organization commitment to safety.	Preparation of Safety policy The contractor should prepare a written policy statement ensures a commitment to: a) Recognize safety on site as an integral part of its business performance;

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Ranking	Factor	Recommended Management Strategy
		b) Achieve a high level of safety performance, in compliance with OSHA 2007 and WIBA 2007 as the minimum legal requirements; c) Provide adequate and appropriate resources to implement the policy; d) Ensure it's understood, implemented and maintained at all organizational levels; e) Consult and involve all employees so as to secure their commitment to the policy and its implementation; f) Keep the policy under periodic review and audit not less than once in each 2 years period from the date on which the proprietor or contractor first brought the written policy; g) Ensure that employees at all levels have received appropriate training and are competent to carry out their duties and responsibilities. Allocation of responsibilities Safety Office/Department The contractor shall set up a safety office/ department responsible for the following main roles: a) Serving as a safety resource centre and in-house safety consultant; b) Planning and preparing safety programmes; c) Advising top management and line management on safety and health matters; d) Coordinating the implementation of safety plans and programmes; e) Monitor the implementation of safety plans and programmes; f) To follow up corrective actions and verify the effectiveness of safety measures. Senior Management a) Provide a safe and healthy working environment; b) Provide adequate resources (including financial resources), information and training; c) Provide a system of monitoring compliance with the safety policy; d) Ensure that relevant safety and health laws are complied with; e) Maintain contact with in-house safety advisors or safety officers, outside safety consultants and government regarding safety and health matters; Line management (including managers and supervisors) a) Assist the contractor in the implementation of the safety policy, measures and procedures; b) Assist the contractor in the identification of hazards, and the evaluation and control of risks; c) Supervise workers to ensure safe and correct working procedures; d) Ensure effective consultation on safety and health matters; e) Investigate work accidents and incidents; Workers a) Conduct work activities in compliance with legal requirements; b) Closely follow safe work practices, procedures, instructions and rules and to perform all duties in a manner which ensures the safety and health at work of himself and others in the workplace;

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Ranking	Factor	Recommended Management Strategy
		c) Contribute ideas on ways to improve safety; d) Report hazards to supervisor and warn colleagues of hazards; Safety committees Setting up of safety committee a) The contractor shall establish a safety committee to each single establishment having the function of identifying, recommending and keeping under review measures to improve the safety and health of the workers in the relevant undertaking. Composition of safety committee a) The safety committee shall have a wide representation covering the interests of management and all workers, yet the size shall be kept as reasonably compact as possible; the number of members representing shall not be less than half the members of the committee. Members of the safety committee can be nominated or elected; Proceedings of Meetings a) Meetings shall be held on a monthly basis in which only matters relating to safety at work of the workers shall be discussed at the meeting; b) The contractor shall ensure that proper records of safety committee meetings are kept to provide a progress report on decisions made, recommendations put forward and actions taken.
3	Lack of proper investigation into incidents and accidents and the prevalence of types of incidents or injuries.	Stages in Risk Assessment and Risk Control a) Identification of hazards; b) Determination of risk; c) Development of safety procedures and risk control measures; d) Implementation and maintenance of safety procedures and risk control measures; Development of safety procedures and risk control measures Safety procedures and risk control measures in descending order of priority shall include: a) Elimination of risks by substituting the hazardous substances or processes with non-hazardous or less hazardous ones; b) Combat of risks at source by means of engineering controls; c) Minimization of risk by means of: ▪ Administrative control measures, such as a permit-to-work system; and ▪ Personal protective equipment as a last resort. Emergency preparedness and effective management of emergency situations Emergency planning a) The contractor shall establish an emergency planning committee or a similar set-up (for example, a sub-committee of a safety committee) to identify all possible emergencies, evaluate their effects and impact, and prioritize and review the list of possible emergencies.

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Ranking	Factor	Recommended Management Strategy
4	Insufficient monitoring and compliance to safety measures.	Inspection program The contractor's inspection program shall include and not limited to: a) A well-designed inspection form to help plan and initiate remedial action by requiring those doing the inspection to rank any deficiencies in order of importance; b) Summary lists of remedial action with names and deadlines to track progress on implementing improvements; c) Periodic analysis of inspection forms to identify common features or trends which might reveal underlying weaknesses in the system; and d) Information to aid judgments about any changes required in the frequency or nature of the inspection programme. Reporting and review a) The results of inspections shall be promptly brought to the attention of the senior management; b) The contractor shall keep full records of each inspection with details of both positive and negative findings; c) Information from safety inspections shall be evaluated promptly to identify immediate risks and to ensure that appropriate remedial action is taken without delay; d) The inspection system should have a way of checking that remedial action is taken and monitored by the senior management; e) Such reports shall be analyzed to identify repeated substandard situations and their underlying causes; f) Records of inspections should be kept for a period of not less than 3 years.
5	Inadequate strict operational procedures.	In-house safety rules General safety rules a) Safe operation and maintenance of plant, machinery and equipment; b) Safe procedures for each construction process, in the form of method statements; c) Provision, use and maintenance of personal protective equipment; d) Rules for the provision, use and maintenance of safe access and egress and for traffic and plant movement; e) Safety procedures for chemical processes and for the handling, transporting and storage of chemicals; f) Duties and procedures for reporting hazards; g) Safety procedures for emergency; h) Duties and procedures for reporting incidents, accidents and ill-health; i) Good housekeeping procedures of the workplace. Specialized safety rules The contractor shall refer to the following: a) The relevant legislation dealing with H&S at work, which sets the minimum standards to follow;

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Ranking	Factor	Recommended Management Strategy
		b) Codes of practice and guidance materials issued by the DOSHS on safety and health at work; c) International standards; and d) The best trade practice and trade performance.
6	Inadequate supply and use of PPE.	Provision of suitable Personal Protective Equipment (PPE) The contractor shall carry out a programme to protect the workers means of suitable PPE as a last resort where engineering control methods are not feasible. The programme to provide PPE shall include, but not limited to, the following: a) Conducting PPE risk assessment; b) Proper selection of PPE; c) Steps to ensure adequate supply of PPE, including replacement supply, and spare parts; d) Steps to ensure the proper use, maintenance and storage of PPE; e) Adequate training, information and instruction to ensure that workers make safe and proper use of PPE and can maintain it properly; f) Monitoring the use of PPE.
7	Poor accident record keeping and reporting.	Reporting of accidents a) A written or verbal notice of any accident which occurs during employment shall be given by or on behalf of the employee concerned to the contractor and a copy of the written notice or a notice of the verbal notice shall be sent to the DOSHS within 24hrs of its occurrence in the case of a fatal accident; b) An employee who is injured in an accident or his dependent, shall, when reporting the accident or thereafter at the request of the employer or DOSHS, furnish such information and documents as may be prescribed; c) The contractor shall, within seven days after having received a claim, medical report or other document or information concerning such claim, submit the claim, report, document or information to the DOSHS; Safety Records The contractor shall be required to maintain in good condition the following records and surrender upon request to the client/regulatory bodies: a) Policy statement and action plan; b) Risk assessment, review and update or amendments reports; c) Material safety data sheets; d) Employers' liability insurance certificate(s); e) Medical and Health surveillance records; f) Safety training records; g) Safety inspections; h) Operating procedures and safe work systems; i) Safety committee meeting minutes; j) Accident and incident investigation reports;

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Ranking	Factor	Recommended Management Strategy
		k) Annual performance review reports and waste transfer notes
8	Level of experience in construction by a worker.	1) No person shall be employed at any machine or in any process, being a machine or process liable to cause ill health or bodily injury, unless he has been fully instructed as to the dangers likely to arise in connection therewith and the precautions to be observed, and a) Has received sufficient training in work at the machine or in the process; or b) Is under adequate supervision by a person who has a thorough knowledge and experience of the machine or process. 2) The training referred to in subsection (1) shall be carried out on - a) Recruitment; b) Transfer or change of job; c) The introduction of new work equipment or materials or change in equipment or materials; and d) Introduction of new technology; 3) The training shall be: - a) Adapted to take into account new changed risks, and b) Repeated periodically 4) Every occupier shall ensure that an employee from other undertakings or establishments including contractors engaged in work at the occupier's workplace receive appropriate instructions regarding safety and health risks including emergency procedures at the workplace during their activities at the workplace and action to be taken in case of an emergency. 5) The training referred to in sub section (4) shall not be at the expense of the employee and shall take place during working hours.

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