

A Study on Safety Audit Management System in Kuwait

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Abstract: *A construction site is one of the most risky, perilous and accident prone working environment. Everyday construction personnel are exposed to a lot of site perils that could result in injury or even fatality. A complete eradication of these construction site dangers are close to impossibility but, it can be reduced to a considerable extent. The safety audit management system is one step to achieve a better, safe and accident-free working environment. A safety audit was prepared on MS Excel and 19 major elements were selected for the study. The audit was implemented in SSH International, Kuwait. For the collection of data for the audit, physical checks/inspections were done. Safety engineers, safety officers and others involved in addressing the safety at the workplace were contacted. Safety records, safety logs, safety registers, minutes of safety meetings, etc. were assessed. The factors that could affect the health and safety of the workers at the site were then ranked based on their criticality. The audit score for the consultancy was 79%. Out of the 19 audits elements, 6 elements were ranked as the primary and secondary causes of accidents. The improper usage of the following 6 elements could affect the Health and the safety of the construction personnel at the aforementioned construction site. The six elements were the following: Amenities/Sanitation, Electrical Works, Excavations, Tools and equipment, Fire protection and hot works, and Personal Protective Equipment's (PPE's). The practical implication of the audit is that the actual work-site conditions could be taken into account through the audit, and based on the happenings at the work-site, suggestive measures could be given.*

Keywords: Audit; safety; construction

1. Introduction

An audit is a systematic and wherever possible, independent examination to determine whether activities and related results conform to planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve the organizations policy and objectives. (BS 8800:1996 Guide to Occupational Health and Safety Management System)

A safety audit examines and determines whether or not a company's daily activities and processes conform to their planned health and safety arrangements as well as the government laws. An audit further identifies whether or not the planned arrangements are implemented effectively, and are suitable to achieve the organizations health and safety policy objectives. Often it is a failure in the health and safety management that results in serious incident. Safety audits assist in identifying failures within a system, process or program and the information gathered helps to determine the best course of corrective action.

Extensive studies have been done on safety audits over the past years. A comprehensive literature review showed that the Safety Audits could impact an organization in a tremendously positive way.

This paper aims at preparing a safety audit, conducting the audit in SSH International, Kuwait, finding out the root causes that could affect the health and safety of the construction personnel, suggesting improvement measures to make the work place a better safe place to the construction personnel.

2. Literature Review

'Alexia Malewaik' in his technical article presented the types of audits, the methods of conducting an audit. The audit not only tests the accuracy of invoices and other charges incurred against the construction project, but may include a review of processes used in project management and project cost/ schedule controls, and a comparison of those processes to industry best practices. Thus, the audit function is an essential project control tool.

D.Sailendra stated safety audit as a vital tool in the hands of top management to ascertain current status of safety scenario, for improving safety performance and for successful implementation of safety programs in construction organizations in India.

Dr. P.Sivaprakash stated safety audit system as an important tool for identifying and assessing the status of existing occupational safety and health management system in an industry. It was carried out by qualified occupational safety and health management professionals or safety auditors. A report of the safety audit was prepared by the audit team bringing out the strength and weaknesses of the occupational safety and health system of the industry along with the recommendations for improvements.

3. Methodology

This research involves the study of the safety audit management system in Kuwait. Literature review was done to identify the objectives of the safety audit management system, the relevance of using the safety audit management system on construction sites, to familiarize with the various

elements used for the audit and to incorporate the most relevant and major elements into the audit that was prepared. Further this audit was implemented in SSH International, Kuwait. The audit score was given to the consultancy. Based on the audit findings, corrective actions and improvement measures were given. Further, the impact the safety audit had on the consultancy was studied.

Steps Involved

- To study the literature available in the form of books, journals and certified audit checklists to get a proper understanding of safety audits.
- Identification of the elements of the audit through literatures and certified checklists.
- Preparation of the safety audit on Microsoft Excel.
- Conducting the audit in the construction site.
- Suggesting the corrective actions and improvement methods.
- Impact of the safety audit was studied.

4. Research Methodology

Identification of the safety audit elements

Different certified consultancies and companies have incorporated different safety elements into their checklists. After the review and study of various literatures and certified checklists, 19 major safety elements that could affect the health and safety of the construction workers at the construction site have been shortlisted. The most important ones are presented in Table 1. The audit is prepared on Microsoft Excel.

Table 1

I. No	<i>Safety Audit Elements (Factors Causing Accidents in the Construction Site)</i>
1.	HSE Resources of Contractor
2.	PPE
3.	Fall Protection
4.	Excavations
5.	Scaffolds & ladders / Temporary works & platforms
6.	Hoisting and Lifting Equipment / MEWP
7.	Vehicles and mobile equipment/ Plants
8.	Tools and Equipment
9.	Fire protection and hot works
10.	Permits to work
11.	Confined spaces
12.	Electrical works
13.	Legal requirements/ HSE inspections
14.	Environmental
15.	Traffic Safety Management
16.	First Aid
17.	Occupational Health
18.	House-keeping site conditions
19.	Amenities/ Sanitation

Data Collection

For collection of data for the safety audit, the audit was implemented in SSH International, Kuwait. Physical checks/inspections were done, safety engineers, safety officers and others involved in addressing the safety at the workplace were contacted. Safety records, safety logs, safety registers, minutes of safety meetings, etc. were assessed.

Data Analysis Method

The above given 19 checks are present in the audit. The checks are prepared in such a way that each check contains further parts. Each element is to be rated on 100% as 0%, 50%, 75% and 100% respectively.

0% - evidence of no compliance and /or no implementation
 50% - evidence of partial compliance and /or no implementation.

75% - evidence of full compliance with only minor exceptions in implementation.

100% - evidence of full compliance and full implementation.

The possible score would be out of 50. The percentage on 100 would then be converted to the actual score. The actual score for each main check (audit element) will then be found by summing up all the actual scores of the sub-checks.

In the executive summary, the actual and possible score for each of the main checks are found.

Percentage of compliance

$$(\text{Score}) = \frac{\Sigma \text{Actual Score}}{\text{Possible Score}} \times 100$$

The percentage score for each Audit element was found. These audit elements were then ranked according to their criticality.

5. Analysis and Results

Data collected from site using the audit were analysed using the MS excel software. The percentage score for the factors under each audit element is shown in the table. This percentage score explains the criticality of the elements; it can also show the extent to which these elements would affect the safety of the workers in the construction site. The percentage score given to the consultancy was 79%

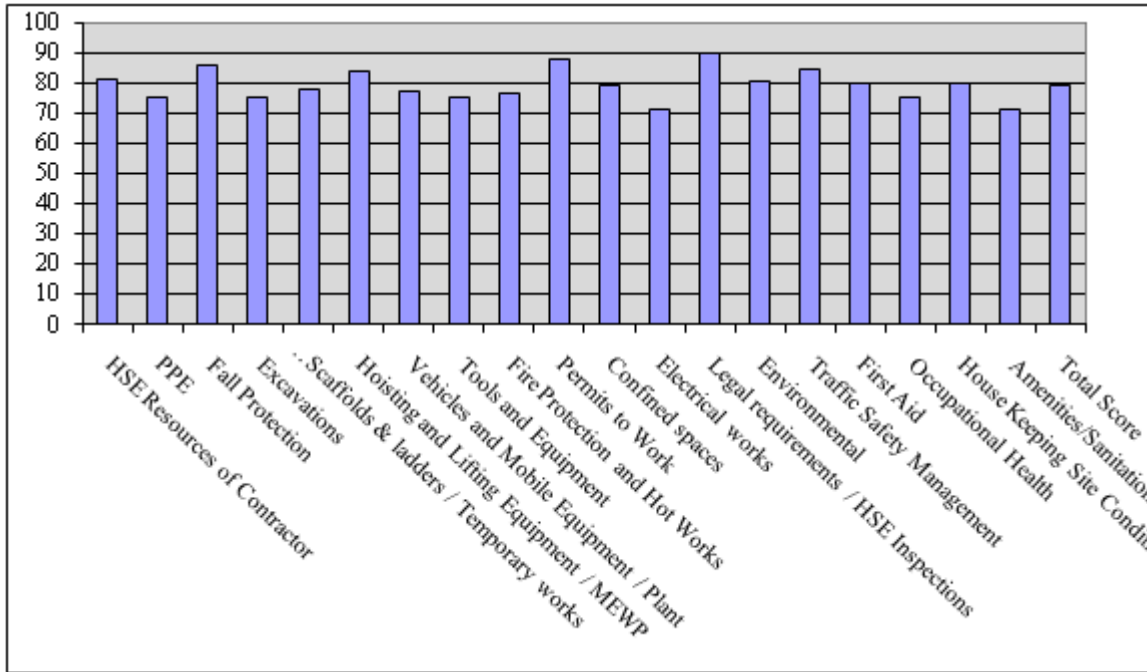
Table 2

Sl. No	<i>Safety audit elements (factors causing accidents in the construction site)</i>	Percent	Rank
1.	HSE Resources of Contractor	81	7
2.	PPE	75	2
3.	Fall Protection	86	9
4.	Excavations	75	2
5.	Scaffolds & ladders / Temporary works & platforms	78	4
6.	Hoisting and Lifting Equipment / MEWP	84	8
7.	Vehicles and mobile equipment/ Plants	77	3
8.	Tools and Equipment	75	2
9.	Fire protection and hot works	75	2
10.	Permits to work	75	2
11.	Confined spaces	79	5
12.	Electrical works	71	1
13.	Legal requirements/ HSE inspections	90	10
14.	Environmental	81	7
15.	Traffic Safety Management	84	8
16.	First Aid	80	6
17.	Occupational Health	75	2
18.	House-keeping site conditions	80	6
19.	Amenities/ Sanitation	71	1

The six most important factors that could affect the health and safety of the construction personnel at the construction worksite

19 audit elements were selected for this study. Out of these 19 elements, 6 elements were ranked as the primary and secondary causes of accidents. The improper usage of the

following 6 elements could affect the health and the safety of the construction personnel at the construction site. The six most important elements were the following: Amenities/Sanitation, Electrical Works, Excavations, Tools and equipment, Fire protection and hot works, and Personal Protective Equipment's (PPE's) and these have been described below.



1) Amenities and Sanitation

From the graph it is clear that amenities/sanitation has a score of 71% and it has been ranked 1. Therefore, it can be a major problem that could cause accidents at the construction site. If proper amenities/ sanitation is not provided to the workers, this can directly affect the health of the workers which can be a major cause affecting the health of the construction personnel.

2) Electrical Works

Electrical works are most often not treated with the respect it deserves. From the graph above its seen that it has a score of 71% and it has also been ranked 1. Therefore, it could also be a cause of accidents at the construction site. Shock related burns can cause accidents. Short circuits can also cause accidents.

3) Excavations

Excavations are vital for the construction projects. It is often required to dig a trench for typical installations. Excavations are recognized as dangerous working areas. From the graph it has been seen that an excavation has a score of 75% and it is ranked as one among the primary causes for accidents.

4) Tools and Equipments

Heavy machine equipment used on construction sites can fail or be dangerous. From the graph the score of this particular audit element has been found to be 75% and it has been ranked as a secondary cause to an accident in the construction site.

5) Fire Protection and Hot Works

Fire is a real threat on any construction site, and usually ignition is from a simple cause such as careless smoking, no housekeeping, and sloppy maintenance on

electrical tools, portable heating, and lack of adequate fire watch or faulty wiring. From the graph, this audit element has a score of 75% and it has also been ranked as the secondary cause to an accident in the construction site.

6) PPE

Personal Protective Equipment's (PPEs) are essential in a construction site. The lack of PPEs used in the construction sites can lead to tremendous amounts of accidents. From the graph, PPE has a score of 75% and it has also been ranked as the secondary cause to an accident in a construction site.

6. Conclusions and Suggestions

The main objective of the thesis was to determine the safety audit elements that could affect the health and safety of the construction personnel, to know their causes, and to identify ways of preventing or solving these problems. 19 major factors contributing to the accidents at the construction worksite were selected for the study. For collecting the data for this project, a safety audit was conducted in the International Consultancy, SSH International, Kuwait. MS Excel Software was used for analysis of the data. From the analysis and results all the 19 factors were ranked according to the criticality by which it would cause accidents. From the study of the Safety Audit Management System in this consultancy , the most important factors that could affect the health and safety of the construction personnel if not given due importance were the following: Amenities/Sanitation, Electrical Works, Excavations, Tools and equipment, Fire

protection and Hot works, and Personal Protective Equipment's(PPE's).

Amenities/Sanitation most often is not given much importance in the construction worksite. It must be noted that this factor could cause a lot of negative impact on the health of the Construction personnel without whom nothing is possible in the construction worksite. Some of the corrective measures suggested was to provide clean drinking water, in the containers that are capped properly. Drinking water containers must be constructed of materials that maintain the water quality. Clean spaces like Cafeterias must be provided for the workers. Waste must be disposed-off properly.

Electrical works was the next major factor that could cause accident and this is also most often not treated with the respect it deserves. Shock related burns, short circuits, etc. are some of the accidents it could cause. This factor is important as it can directly affect the life of the construction workers. The important measures provided was that the safety and health programs must address electrical incidents and the variety of ways electricity becomes a hazard.

Excavation was the next major factor that would cause an accident. It's often required to dig trenches for a typical installation. Excavations are recognised as dangerous working areas. Some of the corrective measures suggested were: the waste earth and construction materials must not be stored within 2 m of the edge of any excavation. Ladder access must be available every 12m for access and egress. Excavations must be clearly marked and barricaded. Heavy equipment must be kept at a minimum of 2m from the edge of excavation depending on soil type/ compaction factor and angle of repose.

Tools and equipment is the next major factor that would cause a construction accident. Heavy machine equipment used on construction site can fail or be dangerous. Tools and equipment according to the study has been found to be the major source of cause of an accident at the construction worksite. The corrective measure suggested was that broken ladders or hammers, axes and similar equipment's must be replaced immediately. Suitable and sufficient tools to be used for the task performed. Appropriate safety glasses, face shields, etc. must be used while using hand tools or equipment's which might produce flying materials or be subject to breakage. Explosive actuated tools must have prior written approval of the Contractors Safety Manager before delivery. Only trained operators shall be operating such tools to ensure safe and proper usage.

The next major cause of accidents was found to be Fire Protection and Hot works. Fire is a real threat on any construction site and ignition is usually from a simple cause such as careless smoking, no housekeeping, sloppy maintenance on electrical tools, portable heating, lack of adequate fire watch or faulty wiring, etc. Some of the corrective measures suggested was that the flammable materials and chemicals be stored according to the manufacturer's instructions/MSDS data and work environment, fire extinguishers to be located in accordance with emergency plan, inspected and tagged for the current

month, flashback arrestors installed on the cylinders, compressed gas cylinders need to be stored, transported and maintained in accordance with the manufacturers recommendations. Regulators must be taken in place and it must not be damaged.

Last but not the least major cause of accident at the construction site was found to be PPEs. Lack of PPEs used in the construction sites can lead to tremendous amounts of accidents. Some of the corrective measures suggested were more implementation of hard hats, provision of comfortable scratch free goggles, hand protection that satisfy standards for each work need to be provided. The ill-effects that could be caused because of the lack of usage of PPEs must be taught to the workers.

Finally, to conclude, a safety audit is the most effective method by which the factors that could affect the health and safety at the construction worksite could be addressed. The actual worksite conditions could be taken into account through the audit and based on the happenings at the worksite, the suggestive measures could be given.

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