

Hazards Identification and Control in Workplace: A Case Study of Fibre Cement Roofing Sheet Manufacturing Company

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Abstract: This study seeks to identify various hazards in workplace and specify necessary control measure. To achieve the aim of this study, safety tour was carried out in workplace to test the level of compliance with safety regulations and factory acts. The outcome of the safety tour revealed thirty five observable workplace Occupational Health and Safety (OHS) related issues which comprises of 91% hazards and 9% good practices. The identified hazards were classified as follows: Electrical, Ergonomics, fire, manual handling, pollution, unsafe practice, slips and trips, vehicular/pedestrian collision and working at height. The result showed that unsafe practices recorded the highest hazards in workplace with 28.12% follow by fire hazards with 21.12%, slips and trips was 12.5%, pollution was 9.37%, working at height, manual handling, Electrical hazards and Ergonomics have equal hazards rate of 6.25% and the least hazard rate was vehicular/pedestrian with 3.13%. Hazard awareness campaign, use of warning signs, dedicated pedestrian walkway, installation of fire detection system and fire-fighting equipment, provision of handling aids for lifting heavy object, and provision and enforce the use of Personal Protective Equipment (PPE) are recommended to control hazards in workplace.

Keywords: Accident, Ergonomics, hazard, Occupation disease and workplace.

Introduction

Health and safety of workers are not commonly discussed in Nigeria as much as they discuss social welfare of workers.

It has been noticed with dismay in Nigeria and globally that millions of workers are being exposed to hazard on daily basis as they seek for greener pasture and career prospect. This hazard could cause injury or an occupational disease to workers. Accident and health problem occur as a result of hazard exposure in the workplace over time. This accident could sometimes resulted to death, maim or permanent disability of workers or occupational disease. If there is no adequate hazard awareness and provision for hazard control in workplace, it is possible for workers to be maimed, incapacitated or possibly died in workplace. Hence, this study is conducted on a typical Nigerian manufacturing company and creates safety awareness among management, the employees, intended employees, government and entire society.

Several studies have addressed hazard, accident and occupational disease in workplace. For instance, Hussein A. Gezairy (2001) stated that a healthy workforce is vital for sustainable social and economic development on a global, national, and local level. He further justified that health and safety in the workplace has depended mainly on the enactment of legislative and inspection of workplaces to ensure compliance with health and safety standards. This approach has been reliable in controlling many specific occupational hazards since the industrial revolution, but this has not been very effective in developing countries for several reasons.

Kwesi Ampons ah-Tawiah et al. (2011) argued that poor countries and companies cannot afford safety and health control measures. However, the study examined Occupational Health and Safety (OHS) issues in Ghana and revealed that lack of comprehensive OHS

policy, poor infrastructure, funding, insufficient number of qualified occupational health and safety practitioners, and the general lack of adequate information were among the main setbacks to the provision of health and safety issues in the workplace.

Jonathan C. Dopkeen (2014) carried out a study on economic burden of occupational injury and illness in the U.S. The study showed that employers spend close to ten billion dollars annually on direct and indirect costs related to occupational injury and illness. The study also showed the relationship of stress disorders to other health conditions, to functional impairment and accidents, and to occupational injuries and illness.

Again, U.S department of Labour (2012) propagated an injury and illness prevention program as a proactive process to help employers find and fix workplace hazards before workers are hurt. The approach in the study effectively reduced injuries, illness and fatalities in workplace and transformed workplace culture that lead to higher productivity and quality, reduced turnover, reduced costs and greater employee satisfaction.

Waqas Ahmed Khan et al. (2014) assessed the existing situation of occupational health and safety in the textile industries of Lahore. The study analysed the health and safety related issues in the industries along with their risks assessment and evaluated work related diseases which affects the workers. Results showed that health and safety policy was not well applied and most workers were unaware of Personal Protective Equipment (PPE)

Alister C. Munthali et al. (2012) inspected workplace in Malawi in order to identify hazards workers' health and welfare and to recommend measures to address them. The inspections of workplace were done in order to prevent occupational accidents and diseases to ensure that employees perform their work in a safe and healthy environment. The outcome of the study provided practical solutions to promote the application of a coherent and harmonised system for collection, recording and notification of reliable data on occupational accidents, diseases and related statistics at the workplace and national levels.

Martin Lebeau et al. (2013) attempted to identify, define, and classify the cost components of occupational injuries and to catalogue the various economic approaches to estimate the related costs. The study showed that the costs of occupational injuries can be grouped into three categories namely: direct costs, indirect costs and human costs. Direct costs consist of components associated with the treatment of injury, such as medical costs. Indirect costs are considered to be costs related to lost opportunities for the injured employee, the employers, the co-workers and the community, while Human costs relate to the value of the change in quality of life the worker and the people around him.

Pamela A. Hymel et al. (2011) discussed workplace health, safety and environmental programs; and discussed how the integration of health protection and promotion activities can improve safety and disease in workplace to reduce injuries and illness. Many other researchers have also carried out related studies in the field of hazards and accident in workplace which space will not allowed me to mention all in this paper.

Methodology

This study entails the inspection carried out on 29th March, 2016 at a manufacturing company in Delta State, Nigeria at about 10:00 hours and the inspection lasted for 45 minutes.

The company have staff strength of 280 consisting 220 operations staff and 60 administration staff. The company consists of the following main sections: Administration and operation Block, Staff Canteen/Kitchen/Stores, Health centre, Factory, Process

control Laboratory, Workers change room, Maintenance Department, Waste paper Kraft Pulper, Ware Houses, Stores (Raw material, Technical and commercial stores), Fire station, Factory access road, Dump site, Plant Control Rooms, Production Department, Vehicle workshop, Central workshop, Generator house, Diesel/petrol station, and Welding workshop.

Considering the size and the many sections in the factory, this inspection was focused on the offices, factory, the stores, the welding workshop, the generator house, control rooms, carpentry workshop, central workshop, the canteen, kitchen and workers change room were captured during inspection. Thirty five observations (identified hazards, and good practice) were recorded as shown in table 1.

Table1. Inspection observation sheets

	Observation	Control Measures
	<i>Hazards, and good practice</i>	<i>Immediate, medium and longer time action</i>
1	There is no segregation of vehicle route from pedestrian's route. Hazard: Pedestrian being struck by moving vehicle	Improve supervision. Provide high visible clothing. Paint walkways at critical point.
2	Blocked drainage system at the kitchen caused back flow of used water into the kitchen. This put the workers at the risk of contracting diseases, could result in contamination of utensils and cause a breeding place for mosquitoes and rodents Hazard: Poor Hygiene, Utensils Contamination, mosquitoes	Apply treatment to all washing surfaces and remove the blockage. Ensure no worker pass solid waste into the drainage. There is need to carryout regular inspection and check to ensure free flow of drainage system.
3	The staff canteen and kitchen were invaded with cockroaches and house flies putting caterers and workers at risk of contracting diseases due to food, water and utensils contamination. Hazard: Hygiene/Food and Water contamination	Apply pest control and fumigation. Implement and enforce cleanliness and good housekeeping practices. Ensure regular inspection of the canteen and kitchen to check for compliance with good housekeeping and hygiene standards.
4	Leakage of water was observed from the hand washing basin in canteen putting workers at the risk of slipping injuries Hazard: Slips, fall and injury	Place a warning sign to indicate wet floor, clean the spilled water and put a container to collect the water droplets from the hand washing basin. Arrange for the repair of the leaking hand washing basin.

		Regularly check for any water leakage
5	<p>Fire risk due to the storage of flammable substance like butane close to an oven in the Laboratory.</p> <p>Hazard: Flammable substances, fire/ explosion and poor housekeeping.</p>	<p>Remove the flammable substance.</p> <p>Keep flammable substance in a safe place.</p> <p>Provide a fire proof cabinet for keeping flammable substances</p>
6	<p>Used chemical bottles were littered outside the laboratory building in an open space putting the lab workers at the risk of inhaling hazardous chemicals as well as fire risk</p> <p>Hazard: Hazardous Substances, Fire/explosion and poor housekeeping</p>	<p>Remove all used chemical bottles from the laboratory environment and clean up.</p> <p>Properly dispose used bottles in an environmental friendly manner.</p> <p>Maintain good housekeeping in and around the laboratory.</p>
7	<p>Adequacies in the provision of PPE for workers but poor compliance in PPE usage by workers were observed which put the workers at the risk while discharging their duties.</p> <p>Hazard: Hazardous substances/Falling Objects/Sharp Objects</p>	<p>Ensure workers use the PPE they need to carry out their jobs safely and ensure that they use it correctly.</p> <p>Train workers on the appropriate usage, maintenance and storage techniques for the various PPE.</p> <p>Put in place a PPE allocation and replacement schemes and appoint competent personnel to implement.</p>
8	<p>Fire evacuation drills and first aid trainings are conducted regularly in the Company.</p> <p>Good Practice</p>	Continue with regular fire drills and first aid trainings
9	<p>Welding job is being done in an unauthorised location without fire extinguisher. This may cause fire outbreak</p> <p>Hazard: Fire</p>	<p>Stop welding work</p> <p>Improve supervision.</p> <p>Provide fire extinguisher</p> <p>Construct a welding boot</p>
10	<p>Risk of eye and face injury due to welder not using visor provided.</p> <p>Hazard: Eyes injury</p>	<p>Enforce the use of PPE</p> <p>Campaign and training on the use of PPE.</p> <p>Implement procedures relating to the use of PPE.</p>

<p>11</p>	<p>Dust emission from Cement spillage while discharging bulk cement tanker. This can cause dermatitis to skin and lungs defects.</p> <p>Hazard: Dust inhalation.</p>	<p>Stop cement discharging operation.</p> <p>Instruct worker to wear eye and nose protector.</p> <p>Replace bad cement discharging hose and clips.</p> <p>Ensure regular inspection and testing of equipment</p>
<p>12</p>	<p>The illumination level in the warehouse was observed to be poor and inadequate putting the workers at the risk of collision with stationary objects as well as trips</p> <p>Hazard: Trips/Stationary objects</p>	<p>Replace all faulty lightings.</p> <p>Provide additional lighting points to achieve the required illumination level.</p> <p>Check and maintain all lightings regularly</p>
<p>13</p>	<p>Improper arrangement and stacking of waste paper bales were observed in the ware house which put the workers at the risk of being hit by falling objects.</p> <p>Hazard: Falling objects</p>	<p>Ensure items are arranged and stacked properly, maintain stacking height with a stable limit and ensure that stacked items are well secured/stable</p> <p>Ensure that workers are provided with the right PPE and that they are appropriately worn.</p> <p>Carry out regular supervision and monitoring to ensure proper stacking of items</p>
<p>14</p>	<p>Broken and non-ergonomic chairs in the control room may cause the risk of operators falling from the chairs and developing musculoskeletal problems with time.</p> <p>Hazard: Ergonomics/Falls</p>	<p>Remove all broken chairs.</p> <p>Advice workers to take break at regular intervals.</p> <p>Provide ergonomic chairs for the workers.</p>
<p>15</p>	<p>Trailing and crossing electrical cables, overloaded electrical sockets and exposed electrical connections were observed in Information Technology (I.T) manager's office putting workers at risk of trips, electrical fire and electric shock.</p> <p>Hazard: Trips/Fire/Electricity</p>	<p>Disconnect all cables away from sockets and cover all exposed connection points.</p> <p>Trunk all cables and provide additional socket points.</p> <p>Monitor to ensure that workers don't allow trailing cables, open connections or overload electrical sockets.</p>

16	<p>Cable from photo copy machine is not secured in the plug which may result in electrocution of workers.</p> <p>Hazard: Electrocution</p>	<p>Remove photo copy machine</p> <p>Ensure cable is secure in plug.</p>
17	<p>Accounting office is congested, poorly ventilated due to faulty air conditioners and have tables that restrict access/egress due to space constrained. These conditions can make the office non-conductive and affect workers concentration, productivity and hinder egress during emergencies.</p> <p>Hazard: Stress, Access and Egress.</p>	<p>Repair or replace faulty air conditioners and rearrange offices to free up space.</p> <p>Move out all unnecessary items that contribute to congestion in the offices.</p> <p>Provide additional office spaces</p>
18	<p>Woods stored in machine shop where hot jobs and welding is being done. This may cause fire.</p> <p>Hazard: Fire</p>	<p>Stop welding job</p> <p>Ensure woods are transfer to the designated place.</p> <p>Provide fire extinguisher.</p>
19	<p>There is risk of injury from falling items due to high stacking of wooden pallets at carpentry workshop.</p> <p>Hazard: fall objects,</p>	<p>Wooden pallets should be rearranged.</p> <p>Transfer the pallets to where they will be used.</p> <p>Provide adequate space for stacking pallets</p>
20	<p>Poor lightings in the factory. This may cause trip, fall and stress to workers.</p> <p>Hazard: poor lightings, stress, trip and fall</p>	<p>Provide additional lightings</p> <p>Implement good system of work and observe break at regular intervals.</p> <p>Training and supervision</p> <p>Provide additional lights most importantly natural light</p>
21	<p>Maintenance worker was observed passing under the moving conveyor. This may cause entanglement.</p> <p>Hazard: draw in, entanglement, abrasion</p>	<p>Stop the moving conveyor.</p> <p>Use of warning sign prohibiting worker passing under conveyor. Fence the conveyor area.</p> <p>Use of PPE like fit coverall, helmet etc.</p> <p>Provide safety guards.</p>

22	<p>Fire risk due to obstruction of the fire exit route with wooden pallets.</p> <p>Hazard: Fire, trip and fall</p>	<p>Relocate the pallet the pallets to safe place.</p> <p>Exit way kept clean at all times.</p> <p>Implement procedures for ensuring the exit ways are always free of obstruction.</p>
23	<p>Oil spillage on the floor at the entrance of vehicle workshop.</p> <p>Hazard: slipping and fall</p>	<p>The floor should be cleaned.</p> <p>Regular cleaning schedule</p> <p>Procedures for handling spillage should be practice</p>
24	<p>Noise as a result of air leakage was observed at piling machine this may cause deafness.</p> <p>Hazard: Noise</p>	<p>Replace the bad hose.</p> <p>Use of PPE e.g. Ear muff.</p> <p>Carryout inspection on the machinery periodically</p>
25	<p>Availability of facilities for workers to wash, adequate number of toilets were provided, toilets were cleaned as well as supplied of drinking water for workers</p> <p>Good practice</p>	<p>Sustain welfare</p>
26	<p>Workers at the Technical store were observed lifting heavy items on unsecured ladders up to 8m high due a faulty fork lift truck. This may put the workers at the risk of falling from height and manual handling injuries</p> <p>Hazard: Fall from height, strain tendon and ligament</p>	<p>Reduce lifting heights to less than 2m, instruct workers from carrying loads that are too heavy and ensure that the ladders is well secured at the top and bottom</p> <p>Provide training for workers on the right lifting techniques and also provide them with the right PPE.</p> <p>Repair or replace the faulty Fork Lift</p>
27	<p>Fire risk due to storage of welding cylinders inside the central workshop</p> <p>Hazard: Fire/explosion.</p>	<p>Relocate the welding cylinder to a safe place.</p> <p>Make use of appropriate fire extinguisher.</p> <p>Provide a gas cylinder storage area in a safe place outside.</p>

28	<p>Insufficient space around concrete tile machine which could cause the risk of workers becomes resisted in movements and may become entangled.</p> <p>Hazard: unsafe condition, ergonomic, and entanglement</p>	<p>Advise workers to be careful while working with the machine.</p> <p>Relocate machine to wider space.</p> <p>Carry out assessment of machine.</p>
29	<p>Bad hoses kept in generators room floor. This may cause slip & trip.</p> <p>Hazard: slip, trip, poor housekeeping</p>	<p>Remove bad hoses and clean.</p> <p>Use of PPE e.g. safety boots, air muff, helmet and hand gloves.</p> <p>Carryout house keep inspection regularly.</p>
30	<p>Worker was observed lifting a big electric motor at the workshop which could cause back injury.</p> <p>Hazard: Manual handling/back pain</p>	<p>Instruct worker to ask for assistant.</p> <p>Train staff in safe lifting techniques.</p> <p>Provide trolley.</p> <p>Carry out manual handling assessment.</p>
31	<p>Fire-fighting equipment. Such as fire extinguishers, fire alarm, water hydrant etc are adequately placed in all strategic places within the organisation. The fire extinguishers are serviced and well labelled according to classification.</p> <p>Good practice</p>	<p>Maintain the facilities</p>
32	<p>Holes in the ventilation duck system at the recuperation saw station could mean that dust are inhaled by workers.</p> <p>Hazard: Dust</p>	<p>Suspend work.</p> <p>Repair holes.</p> <p>Improve inspection and maintenance.</p> <p>Ensure that all ventilation systems are examined by a competent person.</p>
33	<p>Burnt marked was observed on electrical socket which washing machine was connected at the laundry indicating overload which may cause burn to workers.</p> <p>Hazard: Electrical/fire</p>	<p>Provide alternative power supply.</p> <p>Provide extra electrical sockets.</p> <p>Carry out an assessment of the electrical connection in the laundry.</p>
34	<p>A generator is making noise and sign hanged in</p>	<p>Instruct worker to wear hearing protection.</p>

	<p>generator room indicated that hearing protection should be worn. A generator operator was not wearing protection which could cause damage to hearing</p> <p>Hazard: Health/noise</p>	<p>Improve supervision.</p> <p>Train workers on the benefit of wearing PPE.</p> <p>Carry out noise assessment.</p> <p>Implement a programme of hearing test for workers</p>
35	<p>Chisel with damaged handle was seen being struck with hammer in the carpentry workshop which could break and injure workers.</p> <p>Hazard: unsafe practice/cut/abrasion</p>	<p>Replace chisel with good handle and use wooden or plastic mallet to replace hammer.</p> <p>Inspect tools daily.</p> <p>Implement maintenance scheme for hand tools.</p> <p>Investigate why handles are getting damage.</p>

Results and Discussion

Safety tour conducted in the workplace has shown some hazards that require management attention and action to bring them under control and prevent them from causing injury to workers or affecting their performance. Below are the main results of safety tour as shown in table 2.

Table 2: Summary of safety tour

S/NO	Observation	Frequency	Percentage
1	Hazards	32	91%
2	Good practice	3	9%
	Total	35	100%

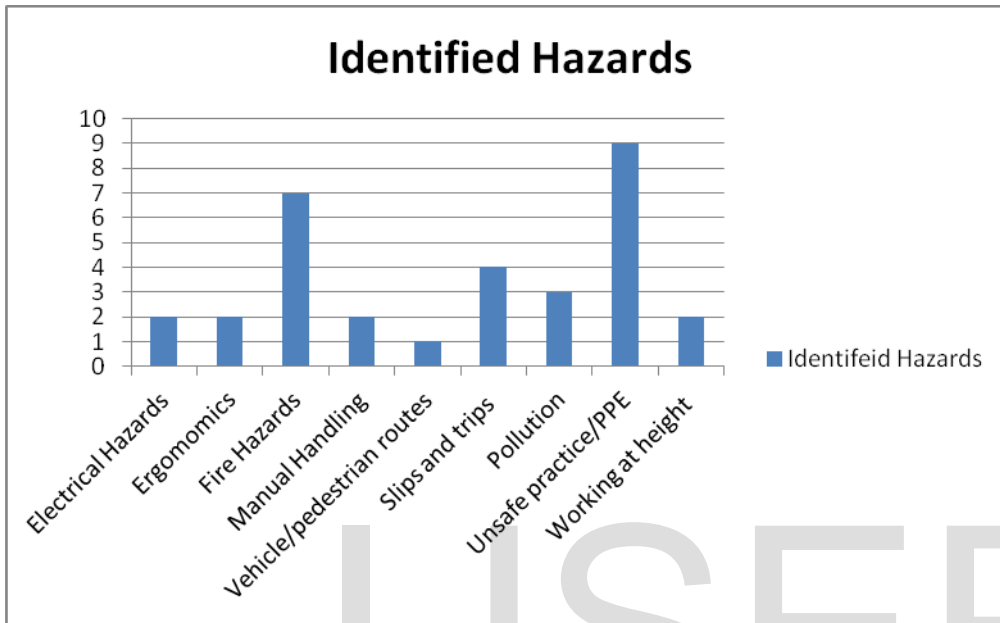
Figure1: Pictorial representation of safety tour



Table 3: Classification of identified Hazards

S/NO	Identified Hazards	Frequency	Percentage
1	Movement of vehicle/pedestrian routes	1	3.13%
2	Working at height and falling objects	2	6.25%
3	Fire Hazards	7	21.88%
4	Manual Handling	2	6.25%
5	Electrical Hazards	2	6.25%
6	Slips and trips	4	12.5%
7	Ergonomics	2	6.25%
8	Pollution	3	9.37%
9	Unsafe practice/use of PPE	9	28.12%
	Total	32	100%

Figure2: Identified Hazards



Conclusion

Though it must be noticed that the management has taken practical steps to improve health and safety in her workplace, the number of hazards identify during the safety tour showed that more efforts still required in reducing and controlling of hazards. The management needs to understand that even though the cost of improving safety is high, the cost of not improving it is higher and dangerous at long runs. This is because poor safety practices and hazards lead to possible accidents that could cause the company to lose several direct and indirect costs such as:

Loss of corporate image/goodwill

Accident investigation time

Loss of competitive advantage and customers

Legal fees and cost of compensation of victims

Loss of raw materials

Loss of production due to damage to plant or closure by enforcement agencies

Loss of man-hours/heavy down time

Payment for non-productive time of victims, first aiders and witnesses

Cost of recruitment and training of replacement staff

Management also needs to understand that by law she owes a “a duty of care” towards her employees and other stakeholders like (visitors, suppliers, contractors and the general public) who might be affected by its operations to provide a safe working place and not doing so will amount to violation of several legal obligations which of course has legal consequences.

The management needs to critically address these areas of concern in order to improve its workplace and occupational health and safety making it to be in line with best practices and to avoid the financial and legal consequences associated with inaction as shown below:

- Speed limit signs and speed breakers should be installed at appropriate intervals along the access road, pedestrian routes should be segregated from vehicle routes, the access route should be expanded and dedicated pedestrian walkways should be constructed at a distance from the road.
- The faulty fork lift in the warehouse should be repaired and if that is not possible a new one should be procured. Supervisor should be trained to monitor the stacking of items in the ware house and offices and ensure that appropriate ladders are used for appropriate heights and are well positioned and secured.
- Fire detection systems should be installed and serviced regularly; safety representatives among the staff should be trained and emergency exit doors should always be free of obstacle.
- Carry out manual handling audit and health surveillance regularly to determine the impact and lifting techniques require for manual handling among the maintenance staff; introduce the use of handling aids to eliminate or reduce the effect of manual handling.
- Isolate power source to the area that have electrical problem; Replace exposed electrical cable with double insulated ones; make sure there is no overloading of sockets and avoid joining along the cables. Replace all bad cables by an electrical technician. Place appropriate warning sign of electrical hazard at area of concern.
- Broken non-ergonomic chairs used by staff should be replaced with ergonomic ones and for all people working with computers should be redesigned to make them ergonomically friendly
- The right and adequate PPE should be provided for all workers that are exposed to hazardous substances. Workers should be trained on the appropriate usage of PPE, maintenance and storage of their PPE and competent supervisors should be appointed from the staff to enforce and ensure compliance with the use of PPE by workers.

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