Safety First is Safety Always – Opportunities and Challenges on Safety Management of Hazardous Employments in India

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ABSTRACT

Organization should provide a safe and healthy environment for its employees. Safety is concerned with the protection of the physical health of employees in the workplace. The Health and Safety Policies aims to create a healthy workplace by reducing hazards affecting the performance of employees. Hazardous working conditions will increase the health risks leading to high rate of absenteeism and attrition. Any unexpected event likely to cause any type of injury to the person or damage to the property and environment is called to be the accident. Frequent exposure of the worker to the unhealthy working conditions slowly develops accumulated effect over an extended period of time causing occupational diseases. All the accidents involving the element of fatality or injury which disables a person from working for more than 48 hours are considered to be the reportable injuries. Occupational hazards are the potential conditions both internal and external transforming into a series of events causing loss. Death, injuries and illness can arise out of safety violations or negligence. Accidents and Injuries happening in the course of employment will cause enormous financial loss to the organization. Safety is the protection against uncertain risks caused by the hazards of electricity, machinery, slip or trip, explosion causing injury, death or damage to people and property. This study aims to describe the fundamentals of industrial safety management for hazardous industries in India.

Keywords: Safety, Hazards, Occupation, Accident, Diseases, Negligence, Damage.

1. INTRODUCTION :

Health is a state of complete physical, mental and social wellbeing but not merely the absence of disease or infirmity according to the World Health Organization. The biggest risks are from jute mills, lead battery manufacturing, chemical units, textile mills, match and fireworks, automotive industry, sugar crushing units, mining, heavy construction, flour mills, etc [1]. Industrial safety ensures protection against accidents and diseases occurring in the industrial establishment [2]. The basics of safety management are listed below.

(a) Safety: It is the freedom from those conditions causing injury or death to people, property, environment, etc.

(b) Environment: All the external conditions and factors affecting organisms including natural and manmade elements.

(c) Accident: According to International Labour Organization It is an occurrence arising out of or in the course of work that results in a fatal or non-fatal occupational injury. It may also lead towards or probably cause an injury.

(d) Injury: It can also be a harmful condition sustained by the body due to the accident in the form of abrasion, bruise, laceration, fracture, foreign object in the body, punctured wound, a

burn or electric shock, etc.

(e) Lost Time Injury: An injury due to which an employee cannot join back for the job within 48 hours which is also known to be a reportable disabling injury.

(f) Reportable Accident: Any accident with fatality or injury which disables a person from working for more than 48 hours reportable to Inspector.

(g) Health: The employee health consists of both physical and mental states which anticipate and recognize potentially the harmful situations and take controlling measures to prevent disease, illness or infirmity.

(h) Records of Medical Examination: Occupier has to undertake a medical examination of workers engaging in the hazardous processes through the medical officer at least once a year and maintain medical records of workers.

(i) Occupational Hazards: A hazard is the inherent potential of something to cause injury or damage to health [3]. Ronald Blake has classified occupational hazards into chemical, biological, environmental, psychological categories [4].

(j) Occupational Diseases: The diseases caused by the unhealthy working conditions prevalent in industries due to the frequent exposure. For example, Workers working in handling wool, hoofs, hides, hair bristles etc., become victims of anthrax [5]. The Factories Act, 1948 vide Sections 89 and 90 have identified 22 occupational diseases [6].

(k) Risk: It is the likelihood of harm resulting from a hazard.

(l) Dangerous Occurrence: According to ILO any readily identifiable event as defined under national laws and regulations, with potential to cause an injury or disease to the person at work or the public.

2. INDUSTRIAL ACCIDENTS :

Factories act states it as an occurrence in an industrial establishment causing bodily injury to a person making him unfit to resume his duties for the next 48 hours. Thus, the accident is an unplanned and uncontrolled event resulting in action or reaction resulting in the personal injury [7]. It differs depending upon the severity, durability and injury it causes. An employee may get injured with external or internal signs of damages. Any accident disables employee for short period is called as minor accident and accident causing death, permanent or prolonged disability is called as 'major' accident. Disability caused by accident may be partial or total, fatal or non-fatal. Apart from mechanical failures, unsafe working conditions, ignorance and negligence of employee there could be multiple interrelated causes contributing to the industrial accidents [8].

3. HUMAN FAULT CAUSING ACCIDENTS:

In spite of having The Factories Act, The Indian Electricity Act, The Pesticides Act, The Boiler Act, The Environment Protection Act, etc accidents are occurring for many other reasons. Statistics reveals that 80 out of every 100 accidents are caused due to the fault of the person involved in the incident. An unsafe act causes four times as many accidents and injuries caused by unsafe conditions. It is reported that in every twenty seconds of every working minute someone dies as a result of industrial accident [9]. The following are the common causes for the accident due to human fault.

- ***Taking Shortcuts:*** Shortcuts to work will reduce safety on the job creates a chance for injury.
- ***Being over Confident:*** When a person thinks accident will never happen to him during the regular work may lead him to adopt improper work methods which may pro a chance for injury.
- ***Incomplete Instructions:*** Any work assigned without providing full information about handling varied tasks involved will create opportunities for injury.
- ***Poor Housekeeping:*** Good housekeeping is the sign of quality which sets standards for pride and safety but vice versa provokes hazards.
- ***Ignoring safety Guidelines:*** Willful ignorance over the safety guidelines can endanger the employees towards leading them to casualty.

- ***Mental Distraction:*** Carrying personal tensions at work may distract the concentration of the worker leading to show negligence over the safety norms which may cause accident.
- ***Unplanned Activities:*** Work carried at the spur of the movement without any preparations may put the worker into possible harm.

4. JOB SAFETY ANALYSIS :

It is a process of Scrutinizing Job to determine the possible hazards and synthesizing the hazards to the acceptable level. Regulation 3 of Management of Health and Safety at Work, 1999 vest the legal obligation of safety analysis upon the competent person for minimizing the likelihood of risks [10]. It will assess the risk present in the work activities to derive adequate precautions to avoid such risks. It is an excellent training tool for employees who are either new or transferred to a new job. Safety analysis is appropriate for those jobs with high injury or illness rates, potential to cause severe injuries or illness, leading to a severe accident with simple human errors, new processes and procedures and jobs which are complex in nature. While conducting Job Safety Analysis select jobs having highest risk of injury or illness, identify an experienced employee willing to be observed, involve employee and immediate supervisor, identify and record each step involved in accomplishing the task, observe the performance of each task, identify potential unsafe acts associated with each task by using the checklist, determine recommended action for performing each step, conduct training on a daily or weekly basis to eliminate the hazard and eliminate the hazard. The findings of the safety analysis will reduce injuries, illnesses and cost on compensation by providing solution to the reluctance of employees to report dangerous working conditions to the management. Aspects included in the Job Safety Analysis (Table 01).

Table 01- Aspects of Job Safety Analysis

Sl. No	Identified Hazards	Risk Assessment	Risk Measured	Required Control	Control Implementation
-	-	-	-	-	-

5. SAFETY AUDIT :

Safety Audit aims to create safe working environment. It is a tool to evaluate different tasks at work to improve the involved aspect of safety in it. It study work operations in order to discover existing or potential hazards to enhance safety provisions. It evaluates the impact of safety system of the industry. Rule 10(3) Safety audit shall be conducted by the occupier once a year in the Major Accident Hazard (MAH) industry [11]. It determines unsafe place of work after reviewing site location, lack of safety, site design, type of job etc. Safety Audit is conducted by Auditor with the help of a checklist. An Inspection Programme organized

to correct the prevailing discrepancies on regular intervals [12]. Internal audit performed by the safety department and external audit is conducted through the outside agency. Audit Plan shall include regular routine inspection, periodic checks on specific aspects, high level audit to ensure total safety. The experts of audit committee will put forth their observations before the top management for the rectification through the proper action plan.

(a) Process: Conducting the preliminary visit to the factory, identify the key elements, prepare the questionnaire, collect data, verify the information on site, Review available old records, prepare the final report along with suggestions.

(b) Legal Obligation: The Major Accident Hazards Control (Karnataka) Rules 1994, Section 10 vests the responsibility on the occupier to prepare safety report and send a copy to the Chief Inspector within 90 days before the commencement of any industrial

activity [13].

(c) Audit Elements: The audit report recognizes the best practices, pin point the existing shortcomings by asserting the safety elements to benchmark the Safety Culture within the Organization (Table 02). The audit will measure the aspects of health with respect to every task involved at a particular point of time. The assessment depicts the level of follow up action taken over the routine inspection process. It provides a critical appraisal on the effectiveness of the Industrial safety. It alerts the Safety Personnel about operating procedures, changes in the equipment or process, application of new technology by reviewing the adequacy of maintenance and safety inspection [14].

Table 02- Safety Elements Used for Safety Audit

Sl. No	Safety Element	Sl. No	Safety Element
01	**Physical Site Condition** Access, Dust, Drainage, Lay Down Area, Material Storage Area, Traffic, Hazards Posted & Barricaded.	02	**Camp** Security, Fire Safety Equipment, Fire Brigade Training, Kitchen Safety, Recreation Safety.
03	**Construction Equipment** Inspection Certificates, ROPS Devices, Lights, Log Books, Back Up Alarms, Operator Visibility, Positive Air Shutoff Devices, Roadworthiness, Extinguishers, First Aid Kits,	04	**Office Complexes** Cleanliness, Visitor Screening, Safe Work Practices, Bulletin Boards, Posting of Emergency Response Plan, Posting of Emergency Numbers, Promotion of Safety.
05	**Personal Protective Equipments** Hard hats, Glasses, Boots, Ear Plugs, Muffs, Clothing, Gloves, Fall Protection etc.	06	**Emergency Safety Equipments** Breathing Apparatus, Fire Extinguishers, Carbon Monoxide Gas Testing Equipment
07	**House Keeping** Visual Impact, Slipping or Tripping Hazards, Fire Hazards, Garbage Containers, Sanitary Facility, Material Storage, Lunch Rooms, Lighting, Office Areas etc.	08	**Rigging/Hoisting Procedures** Lift Study, Slings, Ropes, Signalman, Standard Signals, Hand Lines, Outriggers, Areas Cleaned, Power Lines
09	**Emergency Response** Programmes, Publication, Posting, Communication & Emergency Equipments, Posting Emergency Number	10	**Tools & Equipments** Ladders, Climbing & Hoisting Techniques, Guardrails, Mild Rails, Toe Boards, Work Platform, Compressed Gas Bottles, Hand Tools, Electrical cords, Distribution Boxes, Air Hoses, Welding Shields
11	**Excavation** Permits, Underground Hazards, Egress, Spoil, Flagging	12	**First Aid** Certified Personnel, Supplies, Inventory Control, Records, First Aid Trailers, Emergency Conveyance, Communication Capabilities, Emergency Eyewash Equipment
13	**Fire Protection** Equipments, Smoking Areas, Maintenance Programmes, Fire Response Programme	14	**General Safety Inspection** Frequency, Personnel, Deficiencies Eliminating Hazards, Recording

15	**Safety Attitude** Care, Control, Monitoring, Response, Re occurrence, Training, Promotion	**16**	**Accident Investigation** Competent Persons, Reports, Steps for Preventing Recurrences,
17	**Safety Meetings** Pre Construction Meetings, Daily, Weekly Toolbox Meetings, Weekly Site Supervisors Meetings, Management Meetings	**18**	**Records** First Aid Records, Accidental Reports, Lost Time Report, Incident Reports, Sub Contractor Safety Minutes,
19	**Training & Awards** Supervisor Training, Orientation, Sub Contractor Training, Specialized Training Courses, Safety Awards	**20**	**Work Permit Systems** Work Permits, Conditions
21	**Worker Knowledge/ Attitude** Positive Attitude, Safe Work Procedures, Permits, Job Requirements, Workers Health Management Information System, Fire Equipment Locations, Emergency Response	**22**	**Management Participation** Safety Promotion, Correcting Deficiency, Safety Meetings, Priority for Safety, Investigation, Audit, Driving Habits

6. SAFETY SURVEY :

It is a technique used either by the internal and external authorities to identify the existing dangerous work place hazards. It deals with observing unsafe physical and environmental conditions to identify unsafe practices committed by the workers on the job. Section 91 (A) empowers Chief Inspector of Factories, Director General of Factory, Director of Health Services, Government of India to conduct safety survey. The Process of Safety Survey is conducted in the following way. Firstly, the report on unsafe working conditions or work practices is jointly prepared by the supervisor and surveyor in a tabular form along with quoting remedial measures. Secondly, the observations will be discussed in the meeting to all the departmental heads in the presence of chief executive of the plant. Thirdly, an action plan prescribing the time limit required for initiating remedial measures along with the names of the officials responsible is prepared. Fourthly, the chief executive officer can provide an extension in case the remedial action could not be taken within the prescribed period of time after scrutinizing the cause for the delay. Safety survey eventually overcomes the reporting bias and determines the need for training workers, supervisors and managers. The occupier or manager of the factory, workers and managers should provide all the possible assistance in conducting safety survey to derive fair observations.

7. SAFETY MANAGEMENT :

As Industrial advancement started exposing workers into the new dangers Industrial safety keeps them free from such risks. Stress caused due to role demands, leadership, inter personal conflicts, changes etc cause emotional disturbances, fatigue and exhaustion affecting the health of the workers [15]. Accident proneness is the susceptibility of people towards the possible accidents in the course of different job. The Introduction of new machineries into work has increased the threat of accidents. Industrial activity exposes the employees into the threats caused by man, material and machines demands safety training to protect themselves from disabling injuries. As the loss due to accidents is huge with pain, loss of earning capacity and life, such unexpected events should always be foreseen. The pain and sufferings of the victim both physical and psychological, disfigurement and disablement cannot be measured in monetary terms. Axioms are universally accepted truth based on facts and evidences to develop safety as a science and body of knowledge. The main aim of safety programmes is to prevent work related injuries

and accidents. It ensures zero physical hazards including slipping and falling, collision, obstruction, equipment, fire, falling objects etc at work place [16]. Accident Prevention is a Process to correct the unsafe working conditions in the industrial enterprises to prevent human suffering. It is an integral programme with series of coordinated activities directed to control unsafe personnel performances and mechanical conditions based on knowledge, attitude and abilities. It covers both human and economic objectives. The method of accident prevention influence the attitude of employees handling hazardous employments thereby reduces human fault causing accident. It works on the principle of creating and maintaining interest, fact finding and action based on the available facts. The accident prevention guidelines can be prepared based on the past records, published reports of similar industries, job safety manuals, plant inspection report, safety surveys, accident reports, investigation reports etc. The data on hazards will help to prevent potential dangers at workplaces. For making proper analysis of accidents, The Bureau of Indian Standards is prescribing guidelines for recording any type of accidents. Effective Safety Management should consider safety problems, accident forecast, employee proneness and emerging technologies. Comprehensive Safety Approach should focus on revision of engineering, employee proneness, training, persuasion, appeal, discipline, design, construction, maintenance and operational procedures [17]. Safety Management covers the following aspects.

(a) Work Place Safety: In the due process of delegating managerial authorities employers are forbidden to seek freedom from the responsibility of industrial safety [18]. The management should encourage immediate reporting of unsafe or hazardous conditions directly to the floor supervisors, adhere to the cleanliness and safety guidelines prescribed by the government, label all possible work place hazards, ensure the working conditions of equipments, tools and machines used by the employees, regularly check the machines safety through safety officers, providing employee training to work on dangerous machines, strict compliance over usage of personal protective equipments, conducting safety training on the changing work environments due to adoption of new technologies. Management can initiate the following measures. Safety culture can be inculcated through planned safety education and training [19].

- ***Preventive Measures:*** In order to Prevent contingency it can initiate measures including conducting employment medical examination, organizing periodic post employment medical examination, eliminating hazardous condition, conduct surveillance over women and young person's employed as per the law, provide emergency treatment, educate workers on health and hygiene, train the employees in giving first aid, maintain proper factory layout, illumination, effluent disposal plants, job design, working hours to remove monotony and fatigue.
- ***Curative Measures:*** Establishment shall provide adequate and timely medical treatment and compensation to the workers suffering from ill health, sickness or occupational disease.

(b) Engineering Safeguards: On floor safety procedures prescribed under the Factory Rules including fencing machinery, adequate space between moving parts of the machines, usage of material handling equipments, usage of safety devices, proper maintenance of motion machines etc. shall be strictly complied at daily basis.

(c) Safety Education: It aims to enrich knowledge of the employees on accident prevention through proper dissemination of information in the form of safety manuals for safe repair and maintenance of machinery, work permit systems, fire fighting techniques, usage of personal protective equipment's and first aid for emergencies etc.

(d) Safety Training: It aims to develop safety skills among employee by providing on the job training to work safe on dangerous machines. These training are provided based on the report of analysis of training needs. The training specifies work place hazards and hazards associated to specific jobs. Training to deal with the general hazards is given during induction

and specific hazards are introduced during the job training.

(e) Publicity: Publicity on safety at workplace can be done in the form of programmes, campaigns, granting awards, audio-visual publications, Print publications, magazine articles, trade union manuals, short video clips etc.

(f) Safety Inspections: It is conducted either by the safety committee or by the trained professional to detect evidences on possible hazards including poor lighting, slippery floor, unguarded machines, faulty electrical installations, poor work methods and disregard of safety rules. Following Safety inspections can be performed.

- ***Daily Check:*** Supervisors shall be required to make daily checks on the safety points in their departments to list the problematic conditions and action taken on such defects by the supervisor, safety officer, management respectively.
- ***Regular Inspection:*** In compliance to the Safety legislations or by the insurance companies about boilers, pressure plants, pipelines, dangerous processes, lifts, hoists etc.
- ***Periodic Safety Audit:*** An inspection programme on regular intervals with the help of a pre constructed Checklist to check the safety aspects.
- ***Random Spot Check:*** On the spot checking can be done randomly in the departments to review the unsafe acts or conditions prevailing in the work.

(g) Enforcement: All the employees are trained in safe work practices through the Safety Training Programme. They shall strictly observe all the safety disciplines and any non compliance shall be enforced by imposing penalty to such violator. Safety enforcement is considered to be a part of standing orders or service rules of the organization. The workers indulging in the willful unsafe acts or consumption of alcohol at work places shall be punished as per the disciplinary norms of the organization. Section 88 & 88A of Factories Act, 1948 mandates reporting every fatal injuries to the chief inspector, police and family of the victim along with a detailed report on the causes of the incidence within prescribed time [20]. Section 41C prescribes about medical examination, establishment of occupational health center, medical officers, ambulance van and decontamination facilities. The acts such as Dock Workers (Safety, Health & Welfare) Act, 1986, The Dock Workers (Safety, Health & Welfare) Regulations, 1990, The Mines Act, 1952, Building & Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, The Indian Boilers Act, 1923 (amended in 2007), Dangerous Machines (Regulation) Act, 1983, The Explosives Act, 1884 (amended in 1983), The Petroleum Act, 1934, The Inflammable Substances Act, 1952, The Insecticides Act, 1968 (amended in 2000), The Petroleum and Natural Gas Regulation Board Act, 2006, The Environment (Protection) Act, 1986 (amended in 1991) enforces safety management in hazardous employments.

(h) Safety Policy: In contrary to the erroneous notion of safety management not compatible with the productivity, effective safety policy will reduce accidents by increasing productivity and harmonious industrial relations. Section 7(A) & 41 (B) of Factories Act, 1948 states that high safety standard from the line management can be ensured only through a written Safety Policy. Management should declare about providing safest and healthiest working conditions through the safety policy.

(i) Safety Committee: Section 41 G (1) of Factories Act, 1948 states that every occupier of hazardous factory employing more than 250 employees shall constitute Safety Committee with minimum 06 persons consisting equal number of representatives from both management and employees. The committee shall meet once in 3 months under the leadership of a senior official nominated by the occupier and a manager who represents the management. Rule 81 of Karnataka Factories Rules states that subcommittees can also be formed to work under the control of Safety Committee if required by the Occupier. This committee conducts the overall supervision over the safety management within the industrial establishment.

(j) Government Initiatives: The ministry of

Labour and Employment set up National Safety Council on 4th March, 1966 to promote safety consciousness at plant level, conducting safety programmes. Every year 4th March is celebrated as the National Safety Day and provided with National Safety Awards to industrial units for providing accident free working environment (Table 03).

Table 03- Themes of National Safety Day/Week from 2011-2019

Sl. No	Year	Theme
01	2011	Establish and Maintain Preventative Safety and Health Culture
02	2012	Ensure Safe and Healthy Working Environment- A Fundamental Human Right
03	2013	Working Together to ensure Safe and Healthy Workplace
04	2014	Manage Stress at Workplace and Control Hazards and Safety: It takes all of Us.
05	2015	Build a Safety Culture for Sustainable Supply Chain
06	2016	Strengthen Safety Movement to Achieve Zero Harm
07	2017	Keep Each Other Safe
08	2018	Reinforce Positive Behaviour at the Workplace to achieve Safety and Health Goals
09	2019	Cultivate and Sustain a Safety Culture for Building Nation

(k) Safety Evaluation: Establishments with poor safety record finds difficult in hiring and retaining skilled workforce which may affect the productivity in the long run. Safety responsibility is shouldered by the plant manager, production manager, chief engineer, personnel manager and safety officer. Hazardous process need to be deputed with competent experts for supervision. Concurrent evaluation of programmes, procedures and performance based on the Job Safety Analysis report help to improve the industrial safety. The Safety Policy shall be circulated to all the levels of management and proper training has to be provided to every segment of workforce.

8. CONCLUSION :

Safety culture, safety behavior and safe performance replicate safe workplace [21]. Healthy and Safe work place is the prime concern for industrial establishments since the industrial revolution. Work Place design should consider size, skill and strength of workers, although reach can be extended by stretching, strength can be increased by using tools, skills can be enriched with other aids to reduce unnecessary job stress and productivity. An accident apart from stopping the work disturbs the work tempo which is more costly than the actual cost of that accident. Study reveals that most of the manufacturing industries are lacking in occupational safety management with 52.5 per cent and 69.56 per cent are lacking in policy and administrative system [22]. Internal Health and Safety Organisations (HSO) and Health and Safety Committees (HSC) are not impacting the safety performance of the industries [23]. In reality, safety laws are not strictly enforced, authorities are bending the rules for price, in proper inspections, manipulation of records, breaking safety norms etc. The private sector is negligent over the fronts of safety by cutting costs to remain competitive putting workers at risk. Strict compliance over the employment of women and adolescents on hazardous employments need to be monitored [24]. The complexity generated through advancement of industrial processes should be addressed in the light of safety. The axiomatic approach to integrate safety and environment should be implemented. Twenty first century put forth new mission of controlling accidents by training and educating the workforce on safe work practices. The safety efforts will not succeed only by engineering the machines unless focus on the behavioral changes to improve the individual

efforts on safety. The employees having job clarity has better safety attitude [25]. There is a need to control social and psychological factors making them negligent at work. Safety Officer should engage in the counseling the mentoring of workers to ensure safety at workplace. Most of the accidents can be avoided by changing the work situation with better training and education [26]. The best utilization of human resource is possible by providing alternative employments to the accident prone employees instead of removing them from job and putting them to starve. Participation of trade union in the safety decision making will reduce friction while enforcing the safety norms. More realistic and positive techniques like discussions, learning from each other will ensure safety and health at work place [27]. The efforts towards prevention investment will gain positive results on health and safety management [28]. Multi dimensional approach from management, workers, government and society will collectively improve the overall safety mechanism in the industrial economy [29].

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