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Study of Perceptions of Employees of Hindustan Copper Limited on Occupational Safety and Health Practices

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ABSTRACT:
Safety, health and welfare of people at workplace in industries are intimately related with investigation of accident causation & its remedial measures. Accident investigation is a crucial component of an effective occupational safety and health (OSH) practices in industries for preventing recurrences, **i**mproving safety by taking corrective measures and others as reducing costs, complying with regulations, building a safety culture, protecting reputation, meeting insurance requirements and making information available for litigation in due course of time etc**.** It is important for workers, employers, governments, and the society at large. Researchers are also emphasized the needs to investigate the root cause of accidents with its suitable control measures in industries as the cases of industrial accidents are increasing now a days. The present study aims to assess the perception of employees of Hindustan Copper Limited on investigating accident causation and to prevent its recurrences resulting effective OSH practices in industries.

Keywords: Occupational Safety and Health (OSH), Root Cause Analysis, Accidents, Industrial Accidents, Remedial Measures

INTRODUCTION

Referring to the information of Oxford Dictionary, Hornby A. S. (2019) mentioned in his study that "accident is an unfortunate incident that happens unexpectedly and unintentionally, typically resulting in damage or injury". Accidents do not happen all of a sudden, they are caused by the mismanagement of the events causing to accident. It is not simply because of human or technological failure, but because of the failure of management control systems. Accidents occurs due to uncontrolled events or activities. It is the responsibility of management to control all events/activities in its physical, technological and human aspects. Due to hidden chains of events accident occurs which result into the injury. The causes of accidents could be identified in industries by observing the events minutely. The experiences for high fatal accident rates in industries emphasized the main aim for occupational safety and health education programmes focusing to investigate accident causations and its remedial measures on prevention. Abdelhamid T. A. & Everett J. G. (2000) described "Accident Root Causes Tracing Models" (ARCTM) for identifying root causes of construction accidents. Industrial accidents occur due to three root causes: (1) it may be very difficult rather failed to identify an unsafe condition that existed before an activity was started or that developed after an activity was started; (2) the worker identifies an existing condition as unsafe even then it is difficult in deciding to proceed with a work activity; and (3) it may decide to act unsafe regardless of initial conditions of the work environment. Root cause of industrial accident emphasizes the need to determine how unsafe conditions exist before or develop after an activity is started and proposes additionally that these unsafe conditions are due to four causes: (1) actions/inactions by management; (2) unsafe acts of worker or co-worker; (3) event(s) related non-human; (4) a natural part of the initial work site conditions as an unsafe condition. Each and every accident results from a breakdown in the safety system.

A systematic approach that drills deep into the pin point of the root cause of an incident by repeatedly asking "why" questions until no additional diagnostic responses can be provided. It typically involves an analysis or a discussion soon after an incident has occurred, to identify what type of accidents occurred and how they occurred. Unfortunately, identification of possible root causes of accidents and its reporting, many a times, are not being addressed properly. The accident investigation techniques supported with theories of accident causation and theories of human error could help in this area. Discussion the factors that might lead to accidents 'on sites' and 'in identifying areas' where prevention efforts should be directed, labour and management both might take effective measures for preventing accident occurrence. Conceptually, industrial accident causations can be categorised towards the corrective measures in ARCTM's philosophy.

1. Workers should not be expected to identify all unsafe conditions surrounding their workplace to avoid the possible accident situations who do not have sufficient training or knowledge about their jobs.
2. Workers, without proper training or knowledge about their jobs but still decide to work unsafe will never be accident-free unless their attitudes toward safety change.
3. Management procedures should be so designed to reinforce the value and importance of safety among workers to identify and remove unsafe conditions in a proactive manner.

LITERATURE REVIEW:

The unsafe behaviour or act and unsafe workplace conditions are the causes of industrial accidents. Inadequate information or improper training, unsafe systems of work, poor planning, unclear responsibilities, poor supervision are the few unsafe behaviour or act and poorly maintained workplace with insufficient ventilations or lighting, full of suffocation or slippery work site or unsuitable equipment are unsafe workplace conditions. These failures are the symptoms of failure by the lack of management control which is the root cause of the majority of incidents or accidents in industries. Identifying root cause analysis for industrial accidents in industries, will surely be helped the industries to prioritize better and manage their resources in an efficient and effective way to enhance their safety & productivity and alternatively to achieve the targets with viable cost and economy with zero harm or accident. Through this paper we contributed to identify the potential risks & hazards associated with the industries and prioritize to mitigate or to take control measure towards nullifying them and to make the eco-friendly and healthy working atmosphere or working environment by establishing a good safety culture. Hwey C. S. (2006) on their study on Development of an evaluation matrix of occupational safety and health management system for construction companies expressed his findings as the key processes and key practices of enablers are suitable to indicate the implementation and institutionalization of employee's act or behaviour and physical working condition towards the occupational safety and health management system. Kankaanpaa, Tulder, Aaltonen & Greef (2008) during their study on economics for occupational safety and health stated the objective of study as the role of economics that can help in decision making in occupational safety and health and in their findings have come out that economics can support decision making on different levels. In general, politics concerning occupational safety and health are well justified on economic grounds for employee's act or behaviour and physical working condition. Rahman Z R, Ambreen, Khan & Khan (2012) stated in their study on the status of occupational safety and health in brick kiln industries at Hatter Industrial Estate Haripur, Pakistan with the objectives to evaluate the situation of occupational safety and health laws. It is found that burning cases occur normally, slips and falls accidents occur usually in kilns, falling from cart accident occur in kilns, legs of a child fractured, falling of roof and brick kiln wall accident occurs in kiln and many deaths occur. Further snakebite accident occurs in Kiln and person got die. For all above accidents, no action from any agency of the government has taken and great resentments are present in the kilns workers against the government. Rosemary W M & Jonathan (2016) in their research stated the safety & health is the legitimate in human enterprise by keeping equipment available, should be properly maintained and installation done according to the health and safety policies and their findings as work place safety & health leads to motivation & satisfaction as it has also to be motivated to carry out policy implementation which will finally lead to job satisfaction. Gift G, Mona, Chimbari & Hongoro (2019) studied on a systematic review on occupational hazards, injuries and diseases among police officers worldwide policy implications for the South African police service to describe the occupational hazards, injuries and diseases. Matheus H. A., Oliveira & Lima (2021) while their research on evaluation of the occupational safety management system stated that investing in health and safety management systems reduces various types of costs and negative impacts generated by accidents, affecting not only the organization, but also the social life of employees, also for the employee's act or behaviour and physical working condition and the environment, increasing productivity and the quality and efficiency of services. The manager needs to understand the dangers of risks and way to mitigate them.

RESEARCH GAP:

Reviewed the literatures in context for investigating accidents causations & its remedial measures and assessed that accident causations are not fully explored and also the preventive measures are not properly explained in all aspects.

OBJECTIVES OF THE STUDY:

The study aims to know the perceptions of employees on the accident causation & its remedial measures for the effective occupational safety and health practices in industries. It further aims to study the controlling measures for the recurrences of accidents in industrial perspectives.

RESEARCH METHODOLOGY:

Primary and secondary data both were used for the study. Developed the questionnaires by referring past research papers. Used Five-point Likert scale in questionnaire. The survey was conducted among the working populations in copper industry 'Hindustan Copper Limited' in Jharkhand. The secondary data was collected from the articles published in journals, companies' manuals etc. Considered sample size of 100 for this study. Randomly selected the working employees of Hindustan Copper Limited, Ghatshila, Jharkhand to collect the data.

DISCUSSIONS AND ANALYSIS:

The opinion of the employees was collected on occupational safety and health practices in industries. The factor suggested by Castellan (2011) for construction accidents root causes identification and by Abdelhamid T S & Everett J G (2000) on why workers behave unsafely at work & determinants of safe work practices in industrial worker:

(i) I excessively expose myself to risk while working.
(ii) I have no information for working safely.
(iii) I have no knowledge of risk in my job place.
(iv) I lack enough experience for working safely.
(v) I do not work safely because nobody asks me to do it.
(vi) Work pace prevents me from working safely.
(vii) When there is emergency I cannot act safely.
(viii) If I work safely, I have less opportunities to extend my contract,
(ix) Conditions at workplace are having defects of accident source.
(x) Due care is taken for dress or apparel hazards at workplace.
(xi) Environmental Hazards are prevailing at workplace.
(xii) Workplace is prone to fire hazards.
(xiii) Orientation of workplace signifies hazardous arrangement.
(xiv) Action is taken for removal of housekeeping hazard at workplace.
(xv) Workplaces are engaged with improper assignment of personnel.
(xvi) Equipments or machineries are inadequately guarded at workplace.
(xvii) Control measures are taken towards public hazard at workplace.
(xviii) Undetermined situation is due to management actions/ inaction.
(xix) Workplace unsafe condition is due to (Co) worker unsafe act.
(xx) Non-human related event/ unsafe condition is a natural part of site.

The five points of Likert Scale were: Strongly Agreed (SA) as 1, Agreed (A) as 2, Neutral (N) as 3, Disagreed (D) as 4, and Strongly Disagreed (SD) as 5.The data collected has been tabulated in Table 1. The value of standard deviation and weighted average calculated. Remarks on the perception of respondents for each statement were given based on the value of weighted average.

Table1: Perceptions of employees on accident causation & its remedial measures for effective occupational safety & health.

Sl.No.	Frequency and Percentage					Mean	Standard Deviation	Weighted Average	Remarks/ Perception
	SA	A	N	D	SD				
(i)	38 (38%)	40 (40%)	12 (12%)	4 (4%)	6 (6%)	2.00	1.10		Low Perception
(ii)	14 (14%)	18 (18%)	28 (28%)	24 (24%)	16 (16%)	3.10	1.28		High Perception
(iii)	6 (6%)	16 (16%)	24 (24%)	38 (38%)	16 (16%)	3.42	1.12		High Perception
(iv)	10 (10%)	32 (32%)	24 (24%)	18 (18%)	16 (16%)	2.98	1.25		High Perception

(v)	10 (10%)	18 (18%)	14 (14%)	24 (24%)	34 (34%)	3.54	1.38		High Perception
(vi)	6 (6%)	28 (28%)	18 (18%)	24 (24%)	24 (24%)	3.32	1.28		High Perception
(vii)	4 (4%)	24 (24%)	16 (16%)	36 (36%)	20 (20%)	3.44	1.17		High Perception
(viii)	8 (8%)	18 (18%)	26 (26%)	18 (18%)	30 (30%)	3.44	1.31		High Perception
(ix)	22 (22%)	44 (44%)	12 (12%)	16 (16%)	6 (6%)	2.40	1.17		Low Perception
(x)	30 (30%)	56 (56%)	6 (6%)	6 (6%)	2 (2%)	1.94	0.89		Low Perception
(xi)	20 (20%)	32 (32%)	26 (26%)	16 (16%)	6 (6%)	2.56	1.16	2.66	Low Perception
(xii)	26 (26%)	42 (42%)	18 (18%)	12 (12%)	2 (2%)	2.22	1.03		Low Perception
(xiii)	24 (24%)	28 (28%)	18 (18%)	20 (20%)	10 (10%)	2.64	1.31		Low Perception
(xiv)	50 (50%)	36 (36%)	14 (14%)	0 (0%)	0 (0%)	1.64	0.72		Low Perception
(xv)	4 (4%)	30 (30%)	26 (26%)	28 (28%)	12 (12%)	3.14	1.10		High Perception
(xvi)	4 (4%)	40 (40%)	8 (8%)	30 (30%)	18 (18%)	3.18	1.25		High Perception
(xvii)	22 (22%)	52 (52%)	14 (14%)	8 (8%)	4 (4%)	2.20	1.00		Low Perception
(xviii)	52 (52%)	14 (14%)	26 (26%)	4 (4%)	4 (4%)	1.94	1.14		Low Perception
(xix)	42 (42%)	20 (20%)	8 (8%)	20 (20%)	10 (10%)	2.36	1.45		Low Perception
(xx)	54 (54%)	24 (24%)	12 (12%)	8 (8%)	2 (2%)	1.80	1.06		Low Perception

Histogram analysis for the frequency distribution and cumulative percentage option wise and question wise depicts that majority of respondents rather more than 60% responded the option strongly agree (SA) or agree (A) which supports the topic in favour. Details of charts for the frequency distribution and cumulative percentage are as under.

Chart: 1 Details of frequency distribution

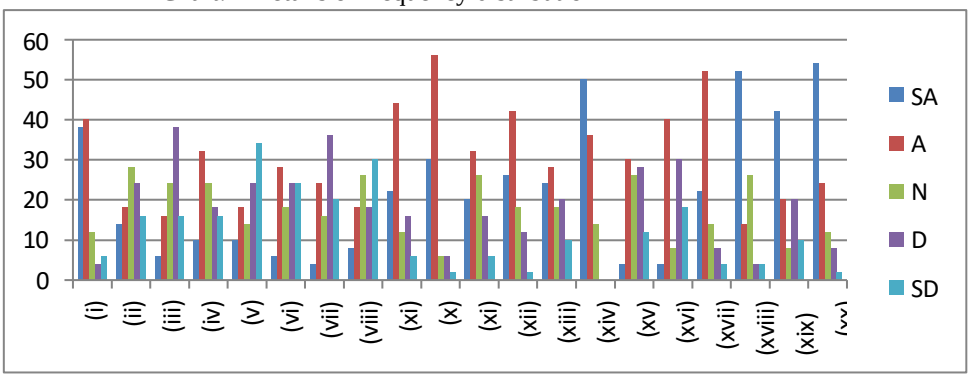
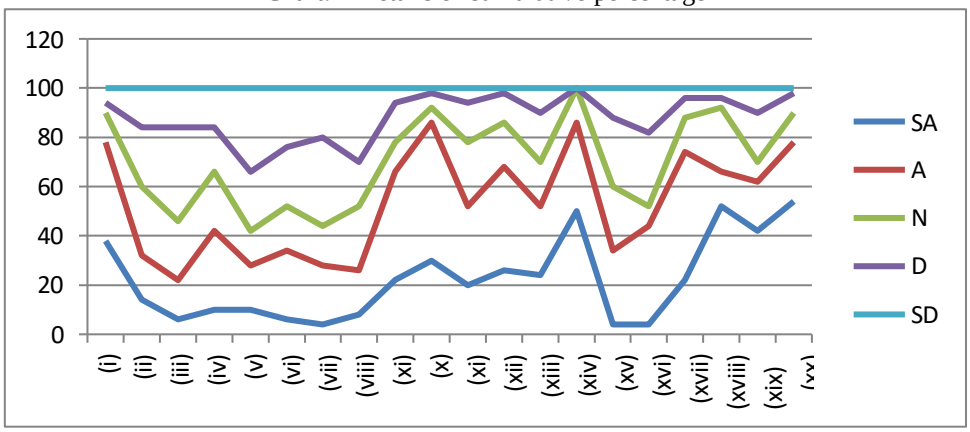


Chart: 2 Details of cumulative percentage



H0: There is no impact of investigating accident causation to prevent recurrence towards effective occupational safety & health practices in industries.

For analysing the data single test ANOVA using MS Excel was applied.

Table: 2 Outcome of analysis

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
2	99	198	2	1.224489
3	99	307	3.101010	1.642754
2	99	340	3.434343	1.248196
4	99	294	2.969697	1.560296
5	99	349	3.525252	1.904968
2	99	330	3.333333	1.632653
4	99	340	3.434343	1.391053
2	99	342	3.454545	1.699443
4	99	236	2.383838	1.361368
2	99	192	1.939393	0.792207
1	99	255	2.575757	1.328385
4	99	218	2.202020	1.040404
3	99	261	2.636363	1.743970
3	99	161	1.626262	0.501752

			3.151515	1.211502		
2	99	312	2	8		
			3.191919			
2	99	316	2	1.564832		
			2.171717	0.939600		
5	99	215	2	1		
			1.949494	1.313749		
1	99	193	9	7		
			2.343434	2.084930		
4	99	232	3	9		
			1.787878	1.128014		
3	99	177	8	8		

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	769.098 99	19	40.47889 4	29.63904 5	2.248E-93	1.5918 22
Within Groups	2676.82 83	1960	1.365728 7			
Total	3445.92 73	1979				

At 5% significance level, the null hypothesis rejected. Therefore, there is a significant impact of investigating accident causations and its remedial measures towards effective occupational safety & health practices in industries. With reference to the data collected, the respondents accepted that occupational safety & health practices in industries is effective by investigating accident causations and its remedial measures at the workplaces. It was also accepted that the resilient management strategy on safety is the main issues responsible for industrial accidents which could be controlled by strict OSH strategy by management as they are accountable towards OSH for their employees.

Majority of the respondents accepted for OSH practices, investigating accident causation and its remedial is effective. This may be in the form of resilent motives, ignoring attitude, less attention and defer for later are the lapses by the managements towards safety factor and lack of safety appliances is a major concern for occuring accidents / incidents at work places.
Occupational safety and health programs are the pillars that uphold a culture of protection, where every individual is empowered to prioritize their well-being and that of others. Optimal safety and safe working conditions are the priorities of the management in industries as the safety & health are their responsibilities.

Occupational Safety & Environment management remains the high priority area of the industries. The industry is always aiming to achieve “Zero Accident” potential and committed to continue sustainable growth and reputation by diligently adhering the ‘Sustainable Development Framework’. In a line of preventive measures, formal standards for behavioral changes, attitudes to act by workers and maintaining proper & safe workplace, resources to meet/exceed standards, a system of measurement, effective consequences, appropriate application and continual evaluation of the system may reduce or rather control the industrial accidents.

Opposite to the above towards the occurances of accidents, resilent motives, ignoring attitude, less attention and defer for later are the lapses by the managements towards safety factor or rather ignorances in safe procedure is a major concern for occuring accidents / incidents at work places. Every accident or incident is preventable by improving employees act or behavior in their attitude to follow safety norms, guidelines as well as use of safety appliances and improving the healthy work environment or rather work place condition and taking adequate safety measures by the management. Measures have to be introduced to avoid violation of safety rules just by ignoring behavioral safety practices.

Root Cause Analysis (RCA) is the process of identifying the root-causes of problems in order to identify appropriate remedial solutions. The method of research includes surveys and fact- finding enquires of different kinds through questionnaires to understand their perception about the causations of accidents towards occupational safety and health in industries.

CONCLUSION:

The study concludes that industries are functioning effectively towards safety and health on workforce. However, discussing best practices, asking questions, and learning from each other helps to improve safety and to prevent loss of life. The purpose is to explain the necessity for developing and implementing effective and efficient safety training and education for the workers. Followings seven hierarchy of control as per study of HSE Guide for Risk Assessment as Remedial Measures in Indian industries are most effective tools to control or rather eliminate accident invariably reducing injury, loss/ damage of property, cost saving and economy:

- Elimination as the most effective control.
- Substitution as the second most effective control.
- Isolation by Enclosures as the third most effective control.
- Training &Awareness for Sorting, Segregation and Barricading as least effective control.
- Engineering controls. It refers to physically isolating people from the hazard if at all possible.
- Administrative controls. It refers to changing the way people work.
- Personal Protective Equipments. It refers to the last but least for protection.

Investigating accident causations towards occupational health & safety in industries is the key for the prevention of industrial accidents and subsequently it is easy to protect or prevent the industrial injury/ harm/ loss/ damage. It is important to recognize work-related diseases in the early stages by promoting the development of occupational health services, including the training of doctors.

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