The importance of Safety Management Practices in Reducing Accidents

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Abstract - **Safety of workers is a major concern for the management in industries. Management should be proactive in identifying, managing and controlling hazards and associated risks. Organizations implement safety management for managing safety functions in order to achieve performance excellence by reducing and preventing accident. Major safety management practices are employee involvement, pre and post task safety reviews, safe work procedures, safety training, communication and information sharing, accident investigation, detection and monitoring and safe task assignment. Safety management practices not only improve working conditions but also positively influence employee's attitudes and behavior with regard to safety, thereby reducing accidents in workplace. This paper explores the impact of implementing safety management systems on industrial accidents. The safety management system is interacted with by individual workers through their participation and engagement in the system. The effectiveness of safety management practices in reducing accident rate depends on the levels of worker engagement. The perceptions of workers also affect the safety performance of the organization. Increased levels of worker engagements in safety activities will leads to increased safety performance.**

Index Terms - **Safety Management Practice, Worker Engagement, Industrial Accidents, Worker Behavior**

1.INTRODUCTION

In industries job related accidents is major concern for management.

[1]Mostly the industrial accidents occur during its execution. In order to prevent accidents, i.e, for safe implementing of tasks organizations are adopting safety management system. Safety management is an overall system for ensuring that safety activities are properly planned, effectively implemented, and arrangement of follow up system. Typically, safety management includes activities such as risk analysis, arrangement of safety training, accident and near-miss investigation, safety promotion and assessment of human reliability.

[2]An accident means the unexpected event causing injury or even death. According to the Factories Act, 1948: It is an occurrence in an industrial establishment causing bodily injury to a person who makes him unfit to resume his duties in the next 48 hours.

[3]Industrial safety pertains to safeguarding workers from potential or actual harm or loss resulting from industrial accidents. Its primary goal is to prevent accidents from occurring within the industrial settings. Essentially industrial safety aims to provide a secure working environment for employees by minimizing the risk of accidents. Safety means a condition where nothing goes wrong. Safety is an epiphenomenon i.e., an incidental product of some process, that has no effects on its own.

[4] There are mainly two types safety namely safety I and safety II. Safety I can be described as a state in which the likelihood of negative outcomes such as accidents, incidents and near mises are minimized as much as possible. Safety II is defined as the ability to succeed under expected and unexpected conditions alike, so that the intended and acceptable outcomes are high as possible.

[5] Now the industries are concentrating on safety II rather than safety I. In industries reduction and prevention of accidents are done by the implementation of safety management system and behavior-based approach system. Each industry is required to adhere to specific government issued procedures with in their safety management system. In this system procedures Government does not strongly emphasize the human element. Organizations will normally follow internationally accepted standard OHSAS 18001:2007. In India Organizations has to follow rules according to factories act 1948. In Kerala state industries has to follow Kerala factories rules 1957. Under the ministry of labor in India National Safety Council came in to existence in the year 1996.

II. HUMAN PERFORMANCE APPROACH IN SAFETY

Safety management system and behavior-based approach system are combined to form human performance system which makes worker in center of all safety related procedures. Managers or supervisors will prepare procedures according to his vision, beliefs and values by taking in to consideration of organizations mission, goals, policies, processes and programs. These procedures are passed on to workers for the execution of the jobs. In between this system of procedures there mainly three error arising situations which leads to accidents namely latent organizational weakness, error precursors and flawed defenses. Latent organizational weakness means undetected deficiency in procedures or in the organization which leads to accidents. Error precursors means the mental condition of the worker or fatigue. Defenses like awareness and warning are there in the organizations to prevent accidents. Worker is performing his work according to his vision beliefs and values. Better management system implementation leads to better safety conscious workers by influencing worker beliefs and vision. Specific human performance can be introduced in industries to improve worker vision and behavior. In the human performance approach to safety management which attempts to understand and eliminate the causes of human error (and thus accidents or events) in the work place from both safety management and behavioral

systems perspectives. The human performance approach to safety management in organizations can be viewed as potentially spanning the rational, natural and open system organizational approaches.

III. HUMAN PERFORMANCE TOOLS

There are a number of human performance tools that can be used to systematically reduce the chance of human error. These tools can be used for providing mental and social skills that complement a worker's technical skills to promote safe and efficient task performance. Some human performance improvement tools commonly used include conducting pre- and post-task briefings, performing peer-checking, and using self-checking approaches such as take-a-minute, STAR (Stop-Think-Act-Review). Pre job briefing allows the worker to think through the job and use his knowledge to make job as safe and efficient as possible. Workers actually involved with performing the work should prepare and lead pre-job briefs. Peer checking is an error prevention technique involving a verbal agreement between two individuals prior to a specific action and/or task, such that one will observe or check the behavior of the other to prevent error by the performer. Self-checking approaches are used in skill-based jobs. In minute rule workers simply take time before starting a job to become aware of the immediate work environment, to detect conditions unanticipated by work planning and pre job briefing. STAR includes Stop, Think, Act and Review. Stop means before proceeding in to work workers has to pause for a while for safety checking. Think about the working procedures and possibility of errors and the Act. After the execution of task worker has to review his work. These tools are worker centric, because they engage workers to have more situational awareness concerning their safety, error traps present, tasks to be performed, and conditions. The development and implementation of Safety management systems can be flawed. Active error occurs because work is being conducted by human who is capable of error. Engagement occurs when individuals are emotionally connected to others and cognitively vigilant.

IV. SAFETY MANAGEMENT PRACTICES

Safety management systems are developed and implemented to identify, evaluate, control and ultimately reduce safety risk and to generate numerous layers of defense that prevent accidents from occurring. A safety management system includes programs, processes, policies, and procedures for which there is formal function overseeing their development, implementation, and ongoing administration. These management practices are codified in writing and issued as approved documents that specify functions, roles, responsibilities and authorities. Workers perceptual process such as safety climate and management commitment are not represented in these practices. Safety climate includes employee perceptions of the attitude of managers toward safety and perception of the utility of production process safety in general.

[6]These perceptions are likely to influence workplace behaviors and affect success of safety programs. Safety climate reflects the shared perceptions that have employees of the relative importance granted to safety issues in their organization. These perceptions serve as a frame of reference and provide psychological guidance for choosing adaptive and appropriate workplace behaviors.

High performance work practices (HPWPs) are human resource management practices aimed at stimulating employee and organizational performance. High performance work practices are a system of best practices and in includes a group of separate but interconnected human resource practices that collectively recruit, select, develop, motivate and retain workers. HPWP theory further argues that workers are capable of continuous improvement and, when motivated, will perform at higher levels. Employee perception can be improved by the use of high-performance work practices which ultimately improve the behavior of the worker. HPWP theory can be applied to a system of safety management practices in order to gain a more precise understanding of their functioning and impacts from a human performance perspective. It is possible to view safety management system practices as exhibiting traits of HPWPs. These safety management practices are designed to influence employee knowledge, skills, motivation, decision-making, attitudes, and perceptions

V. WORKER ENGAGEMENT

There are three types of employees in an organization namely engaged, dis engaged and actively disengaged. Engaged employees work with passion and feel a profound connection to their company. Not engaged employees are essentially checked out. They are sleepwalking through their workday, putting time but no energy or passion to their work. Actively disengaged workers are unhappy at their work. The connection between the employees and organization can be characterized as the property of employee engagement. An engaged employee is defined as one who is fully absorbed by and enthusiastic about their work and so takes positive action to further the organization's reputation and interests. Worker engagement in safety will systematically act to reduce the probability of human error from occurring by making workers more involved with and aware of their tasks/surroundings and associated risks and error traps. The perception of employees can be quantified as a measure of worker engagement. Worker engagement is a motivational concept leads to desired behavior consequences. When workers are engaged in safe task execution, a conscious effort is being made on the part of worker not to be overconfident, skip safe work procedures, and/or under estimate risks involved. From a behavioral perspective, workers bring their beliefs, values, and vision to the design and implementation of safety management systems and ultimately in performing work. In particular, the individual worker interfaces with the safety management system by participating or engaging (or by not participating or engaging) in the system. Motivation to participate can be affected by workers beliefs and values, which can impact the workers degree, quality and consistency of participation. When accidents occur, the behaviors of workers, who are at the sharp edge of accidents and who interface with both the hazards and the safety management system itself, are closely scrutinized during accident investigations. This inquiry focus most likely leads to the often quoted and misapplied statistic that the vast majority of all accidents are caused by unsafe acts (i.e., human behavior)

VI. SAFEY PERFORMANCE STATISTICS

Two safety performances are mostly taken for study purposes namely Total Recorded case and Days Away Restricted or Transferred. TRC case rate is calculated by multiplying the number of recordable cases by 200,000, and then dividing that number by the number

of labor hours at the company. DART case rate is calculated by multiplying the number of DART cases by 200,000, and then dividing that number by the number of labor hours at the company. [7]Positive safety results can be achieved through worker engagement. Through literature review and interviews they identified ten management practices for study. Worker cognitive and emotional safety engagement is taken in to consideration. These identified factors are listed and discussed below.

1. Employee involvement
2. pre-and post a task reviews
3. Safe work procedures
4. Hiring for safety
5. Cooperation facilitation
6. Safety training
7. Communication and information sharing.
8. Accident investigation
9. Detection and monitoring
10. Safe task assignment.

VII. METHODS AND MEASURES

[7] A survey was conducted to evaluate the correlation between current safety management practices, levels of employee engagement, and outcomes related to safety performance. Through the American Society of Safety Engineers member-ship database, a 69-item survey was distributed to 2400 safety managers mainly across the U.S. The response rate was 14% (342 safety managers fully completed this survey in study number one). The survey included questions related to the organizations demographics, demographics and employment information related to the survey respondents, the safety management practices utilized at the establishment, the perceived level of employee safety engagement, and the establishments accident and injury statistics. The mean number of workers per establishment was 632. Multiple sectors were represented in the sample, including agriculture, construction, transportation and distribution, education, government, healthcare, light manufacturing, heavy manufacturing, mining, research and development, and service.

Each practice measured using composite of multiple questions. Practices are measured using seven-point scale from strongly disagree (1) to strongly agree (7) except for the following items: how often are pre-task safety reviews done? (7 points scale: 1 = never to 7 = always); percent of routine tasks that safe work procedures have been developed (1 = 0%, 2 = 25%, 3 = 50%,4 = 75%, 5 = 100%); percent of high risk jobs that have completed hazard analyses (1 = 0%, 2 = 25%, 3 = 50%, 4 = 75%, 5 = 100%); number of hours of safety training per year (1 = 0, 2≤ 10, 3 = 11 to 20,4 = 21 to 30, 5 = 31 to 40, 6 ≥40); and how soon investigations are initiated after their occurrence? (Accidents are not investigated, less than 24 h,24 to 48 h, greater than 48 h). They first computed reliability coefficients (i.e., Cronbach's E) for each of the sub scales and identified items that decreased the reliability for each sub scale. Based on this analysis, two items designed to measure training and one item designed to measure accident investigation were removed from the scales. After removing the items, the resulting internal consistencies for each of the practice sub scales achieved acceptable levels, with a range from .713 to .913 (average is 0.794).[8] Confirmatory factor analysis (CFA) using SPSS Amos 20 was performed to investigate the fundamental structure or dimensionality of the safety management scale.

VIII. RESULTS AND DISCUSSION

Survey measured the degree of employee engagement with the organization. Safety managers completing the survey were asked to evaluate the degree of employee engagement within their corresponding establishment. Worker engagement measured on a five-point scale (strongly disagree to strongly agree). The two questions as provided in the survey for study were: (1) Workers are emotionally engaged in the safety program. (2) Workers are cognitively engaged in the safety program.

They outline the procedure as follows. First, the predictor (i.e., safety management system practice composite) must have a significant statistical association with the outcome (i.e., TRC and DART rates). Second, the mediator (e.g., worker engagement) must also be significantly related to the outcome (i.e., TRC and DART rates). These relation-ships are typically shown through two regression models where the outcome is first predicted by the predictor alone and second by the mediator alone. In both regression models, the relation-ship between the predictor/mediator and the outcome variables should be significant. Third, the predictor (i.e., safety management system practice composite) should significantly predict the mediator (i.e., worker engagement). Fourth, when both the predictor and the mediator are entered into a multiple regression model, simultaneously predicting the outcome, the previously established relationship between the predictor (i.e. safety management system practice composites) and the outcome (i.e. TRC and DART rates) should disappear while the mediator remains significant. These steps are necessary to statistically support the claim that through worker engagement, for example, safety management systems impact organizational injuries and illnesses.

IX. CONCLUSION

TRC and DART rate are negatively and significantly correlated with the engagement and each of ten management practices. TRC and DART rates are highly correlated with each other. Both safety management practice and worker engagement levels can be used to predict TRC and DART rate. Success of safety management practices depends on the level of safety focused cognitive and emotional worker engagement. Thus, when organizations invest in a safety management system approach to preventing accidents from occurring and to improving safety performance, they should also be concerned about overtly winning over the minds and hearts of their workers through a system of worker engagement. Perception of worker also affect safety performance of the organization. Safety management system practices should be designed and implemented to promote and enhance worker engagement, thereby putting workers at the center of safety management system.

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