

Importance of Error Management in Occupational Safety: A Case Survey Conducted in Manufacturing Set-ups

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Abstract

Human failures in workplace may lead to accidents which will affect the individual as well as to the organization. Attribution of human error as the cause of accidents and incidents is common in accident reports. In order to improve the safety aspects of the organization, time and financial resources are being spent. In spite of safety policies, rules and regulations, many accidents, and incidents are being reported from different sectors. The current study focuses on the errors management in medium and small scale manufacturing setups. Authors argue that it is important to view errors as a positive feedback and having a growth mindset towards errors can improve the safety culture thereby improving the overall productivity and efficiency of the organization. Questionnaire on error management culture of the manufacturing set-ups is prepared and distributed among the medium and small scale industrial operators of the manufacturing setups situated in the Mysore city. Statistical reliability analysis of error management questionnaire is carried out and it is found that instrument is reliable and can be used to assess the error management culture of the organization.

Keywords: Workplace safety • Industrial accidents • Cognitive errors • Error management

Introduction

Studies to date suggest that majority of industrial accidents occur because of human errors. Human error has different causes, however, in all cases cognitive abilities and limitations of human play an important role. While human errors are a threat to the industries' reputation and work progress and efficiency, the positive aspect of the errors can be recognized and put to good use in terms of learning and innovation to impart methods to mitigate the human errors and avoid failures at workplace.

Cognitive failures at work (or errors in the workplace including blunders and memory lapses), can lead to considerable personal and organizational damage, even damage well beyond national borders in some organizations [1]. The paper aims at providing a clear understanding of the various aspects of error management, with the help of data obtained from the responses of the Error orientation questionnaire and Error Management Questionnaire distributed among the employees of the operational and management levels.

Understanding the role of cognitive failures in industrial accidents

Of attention is clearly a part of everybody's life. Some of it is merely inconvenient like, missing a familiar turn-off on the highway, and

some are extremely serious, such as failures of attention that cause accidents, injury, and loss of life. Managers believe that lapses of attention are also inherently cognitively debilitating. Regardless of the cause, impaired attentional capacities at critical moments may make workers highly susceptible to accidents. Although attention is unreliable, limited in its capacity and only partly under voluntary control, environmental design and education can enhance attention and performance and prevent attentional failures and reduce the consequences of temporary attentional deficits, in turn preventing hazards in the workplace.

The cognitive errors can be defined as cognitive-based errors on simple tasks that a person should normally be able to complete without fault. These include numerous types of execution lapses: lapses in attention, memory, and motor function [2]. Some cognitive failures occur frequently and it may not produce any serious consequences, some failures, under explicit circumstances may result in accidents. Cognitive failures are considered in most of the studies related to industrial accidents due to two main reasons. First, they are in effect human errors and human error is associated with many accidents. Second, this sort of slip occurs more frequently than accidents; cognitive failures may occur in many contexts, but only in some situations will they lead to accidents. There is some evidence to suggest that there is a link between cognitive failures and accidents.

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Accidents and injuries in the workplace remain a cause for concern for the operator and employers alike. An accident and incidents are an unforeseen event in the workplace settings which is neither anticipated nor designed to occur. Thus an industrial accident is referred to as a sudden and unexpected occurrence in the industry that interrupts the orderly progress of work. According to the Factories Act, 1948: "It is an occurrence in an industrial establishment causing bodily injury to a person that makes him or her not fit to resume their duties in the next 48 hours".

The cause of accidents are mainly associated with defective plants, tools, equipment, machines and materials or sometimes due to lack of knowledge or skill on the part of the worker, certain bodily defects and wrong attitude or due to unsafe situational and climatic conditions and variations which may include excessive noise, humid conditions, unhealthy environment, slippery floors, arrogant behavior of domineering supervisors, etc. Besides, there are also several psychological factors such as working overtime, monotony, failure, stress, tiredness, frustration and anxiety that cause accidents. It can be clearly seen that often closely related multiplicity of causes result in an error, accident or failure. Also, mental slips and attentional failures are not bizarre or random events, but relate to our every-day habits and follow patterns that suggest predictability and prevention. This necessitates the study of errors and error management culture in an organization. While understanding why errors occur and how to prevent them plays a very important role in an organization, studying and understanding the error orientation and error management culture of the organization also plays an equally important role in the safe and effective functioning of the organization.

Error management

It is vital to consider that errors and mistakes in an industrial processes and procedure could cause losing value for organizations in terms of productivity. The responsibility of wellbeing of the organizations and the achievements or failure must be fully assumed by the management. Through this approach, the amount of errors can be mitigated by creating an environment in which organization could operate with a positive attitude and frame of mind. Attitude is a subjective concept that represents an individual's like or dislike for an item. It can be positive, negative or neutral views towards a person, behavior or event. Persons can also have ambivalent views towards a target that they simultaneously possess a positive and a negative bias towards the attitude in question.

Error orientation

Cathy Vandycck in her doctoral work investigated that Errors is the deviation from right track which has an impact upon behavior of an individual. Errors and Attitudes are important issues in work psychology for a number of reasons. She developed an error culture questionnaire and concluded that beliefs, attitudes, norms and behavioral approaches regarding errors could be shared and that error culture does exist. The reaction of management toward errors could be placed in two basic categories - punishment and empathy. The replication and the function of exploratory behavior, and the effect of training were researched. Cathy Van dyck argued that if a company attempts to change its culture one needs a measure of error orientation. Van Dyck, The bureaucratic companies usually have the attitude to prevent errors from happening at all costs, while the entrepreneurial business usually

have a more positive attitude towards error and that can be learnt from them. Norman suggested that because error is inevitable, designers should minimize the causes of error, make it possible to undo erroneous actions and make it easier to discover and correct errors. Therefore, it is evident that error management and its plan of action is an important issue in organizational settings.

Materials and Methods

The study and analysis of the error orientation and error management culture prevailing in the medium and small scale industries of Mysore city was carried out using the survey methodology. Error Orientation Questionnaire for Operational and Managerial levels and Error Management Questionnaire for the Managerial level are used as the main tool. The two questionnaires were distributed among the various levels of employees; the opinions of the various levels of employees were analyzed. The Error Orientation Questionnaire for Operational and Managerial levels and Error Management Questionnaire for the Managerial level were distributed among the workers and employees in the operational and managerial levels in the different Industries. A total of 82 (n=82) questionnaires were distributed, among which a total of 53 questionnaires were returned with responses from the employees, out of which 6 questionnaires with responses were found invalid for the process of analysis. The responses for each item on the Error Orientation Questionnaire and Error Management Questionnaire were observed in detail and a reliability analysis of the instrument is carried out to calculate the Cronbach's alpha. Also, number of inferences has been made from the gap that was witnessed in the attitudes of the operational and managerial levels, obtained through the responses from the two respective questionnaires.

Results and Discussion

A total of 82 questionnaires of operational level and 15 of managerial level were distributed, out of which 53 and 8 questionnaires respectively were returned with proper responses. 67% of the managerial level employees favor the open discussion of errors to be fruitful, 52% of the operational level employees feel that errors can do more harm than good, to their reputation. It was found that 71% of the operational level employees are working with the motto, "Why admit an error when no one will find out?" It was found that no errors were being admitted by the employees until they were detected.

	Cronbach's Alpha	No. of Items
Error competence	0.604	4
Error management	0.704	3
Learning from errors	0.71	3
Error risk taking	0.764	3
Error strain	0.506	2
Error anticipation	0.669	4
Covering up errors	0.623	4

Table 1. Cronbach alpha calculation.

It was also observed that the goal of completely understanding the reason for the occurrence of an error existed among 77% of the operational level employees. However, it was also observed that 71% of the employees also failed to admit their errors without being detected. It was found that lot of difference of opinions was prevailing in the opinions and attitudes of the employees working in the industry.

A lot of reasons due to which the workers step back from confessing errors committed by them were also observed and the way of approach of management towards error consequences was witnessed to be one of the reasons for it. The following charts illustrate the respective responses

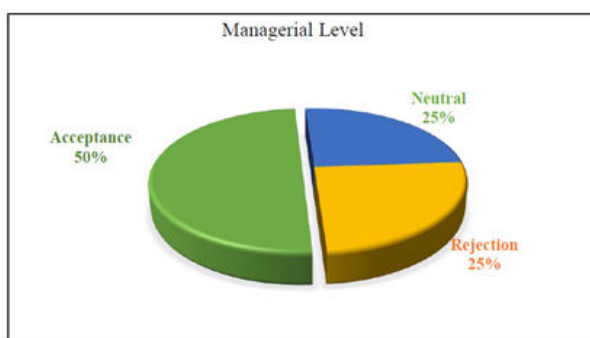


Figure 1. Percentage of managerial level employees considering the reporting of errors.

It was found that 71% of the operational level employees are working with the motto, "Why admit an error when no one will find out?" It was observed that no errors were admitted by the employees until they were detected [3]. However, on analyzing the responses from the managerial level employees, it has been observed that almost half of the managerial level employees exhibited the attitude that announcing the errors made by a person would have a negative effect on his or her career. It can therefore be inferred from the data obtained that the attitude of the management towards the occurrence of errors from the workers is another reason for the denial attitude of the workers. Thus it can be suggested that a positive approach towards error consequences is necessary to detect the nature and frequency of errors and implement suitable preventive measures.



Figure 2. Percentage of operational level employees refusing to admit their errors.

It can also be observed that the goal of completely understanding the reason for the occurrence of an error existed among 77% of the operational level employees [4].

However, it was also observed that 71% of the employees also failed to admit their errors without being detected. It has very well been witnessed that taking time to analyses what caused an error plays a vital role in finding out the way in which it could have been prevented.

Nevertheless, this is possible only when the occurrences of errors are brought to the notice of the management, in order for them to be analyzed and prevented in the future [5]. For this condition to be satisfied, the attitude of the management has a major share to contribute.

Conclusion

A lot of error management techniques are in practice, it has to be noted that industrial accidents due to human failures cannot be completely eliminated as cognitive failures are not always under voluntary control of humans. It can be concluded that, with safety training and safety manuals being a must in an industrial set up, a positive approach to consequences of human error also has to be made mandatory within the management. As a result, the objective of achieving industrial safety in any industrial set up can be directly linked to the error orientation culture and error management culture. Naturally, for any employee, an industrial set up with a good error orientation and error management culture becomes a safer, healthier and satisfying place to carry out the task in safety work environment.

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