Human Factors Influencing accidents

A. Mohan Raj[1], Dr.K.Muthukumar[2]

[1]PG Student, [2]Professor, Department of Mechanical Engineering, Bannari Amman institute of technology, Erode, Tamilnadu,India.
Corresponding Author:mohanraj.is21@bitsathy.ac.in

Abstract
The aim of the study was to identify and classify human factors which influence human errors that cause accidents and injuries. This involves the study of 107 accidents and near misses which occurred in the past eight months in an automobile industry. Data were collected in an automotive manufacturing unit through interviewing and through the incident investigation reports. All accident precursors and human factors were identified and reported and analyzed and classified.
Keywords:Human factors, Accident precursors,

I.   INTRODUCTION

The Health and Safety Executive (HSE) describes human factors as a scientific discipline concerned with the study of human cognitive and physical needs as they interact with the work environment, their effect on equipment and system design, and on human performance. [1]. The identification and study of human factors is of particular importance to the field of safety because these factors contribute to human error. Their field is broad as it "studies the intersection between people, technology and work with the main aim of finding areas where design and working conditions cause human error" [2]. Analyzing human errors and their role in accidents is an important part of the development of systematic methods of industrial reliability and risk prediction. To obtain data for predictive analytics, it is necessary to analyze accidents and incidents to identify their causes in terms of component failure and human error [3]. By addressing human factors and analyzing human interactions, as well as risks which are related to communication and emotions, there is potential to improve the safety management system. One inherent weakness of safety management systems is related to accident reporting and the evaluation of incidents and near misses. It is often not conducted in sufficient depth or with the appropriate approach. Attempts to minimize the effort of analyzing the failures and errors occurred are definitely not what is needed. This does not occur in order to reduce guilt, but often due to a lack of insight [4].Accidents are caused by active failures or latent conditions that can lead to human error or violations. Active failures are actions or conditions that precipitate an incident situation. Usually affecting front-line personnel, the consequences are immediate and can often be prevented by design, training or operational systems.
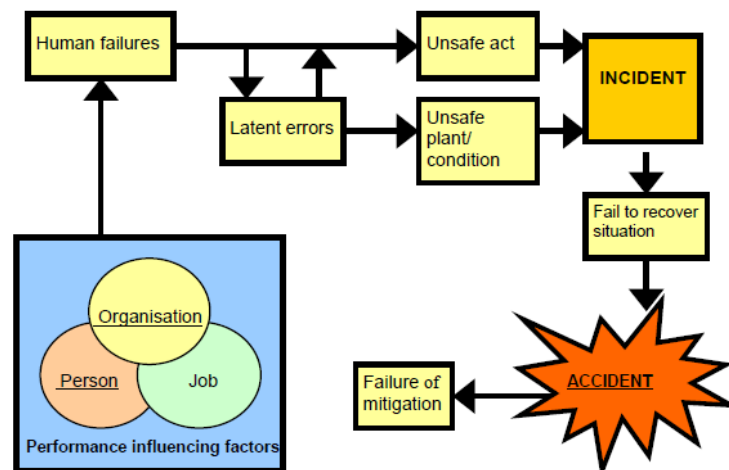

Fig 1: Accident Model

II.   DATA COLLECTION

The data shared here was collected during a three-month project in the automotive industry. Accidents and near-accidents during eight months in the company were taken as a research sample. 107 incidents that befell during this period were analyzed and classified according to the aspects that led to the incident. Occupational accident reports provided include the following information: name of the person involved in the accident, age, position of the operator, description of the accident, type of injury, factors contributing to the accident, object that caused the accident, corrective actions taken to prevent it from happening again , so responsibility for their implementation. Furthermore, an accident investigation questionnaire was developed to identify the human factor. The persons involved in the incidents were interviewed in person and we recorded their statements about the accident and their response to the questionnaire, the persons involved in the incidents who retired or transferred from the organization, the supervisor or reporting manager were interviewed about the incident.

III.   METHODOLOGY

The observations were analyzed by the Human Factors Analysis and Classification System and classified according to the taxonomy (Fig. 2). Based on this approach, 100 observations of crash-precursors were collected, analyzed and categorized [5]. Table 1 summarizes all data divided into categories and subcategories (if any). The 'Description' column gives the reason why these observations signified a relevant increase in risk. The third column of Table 1 lists the number of events in each category.
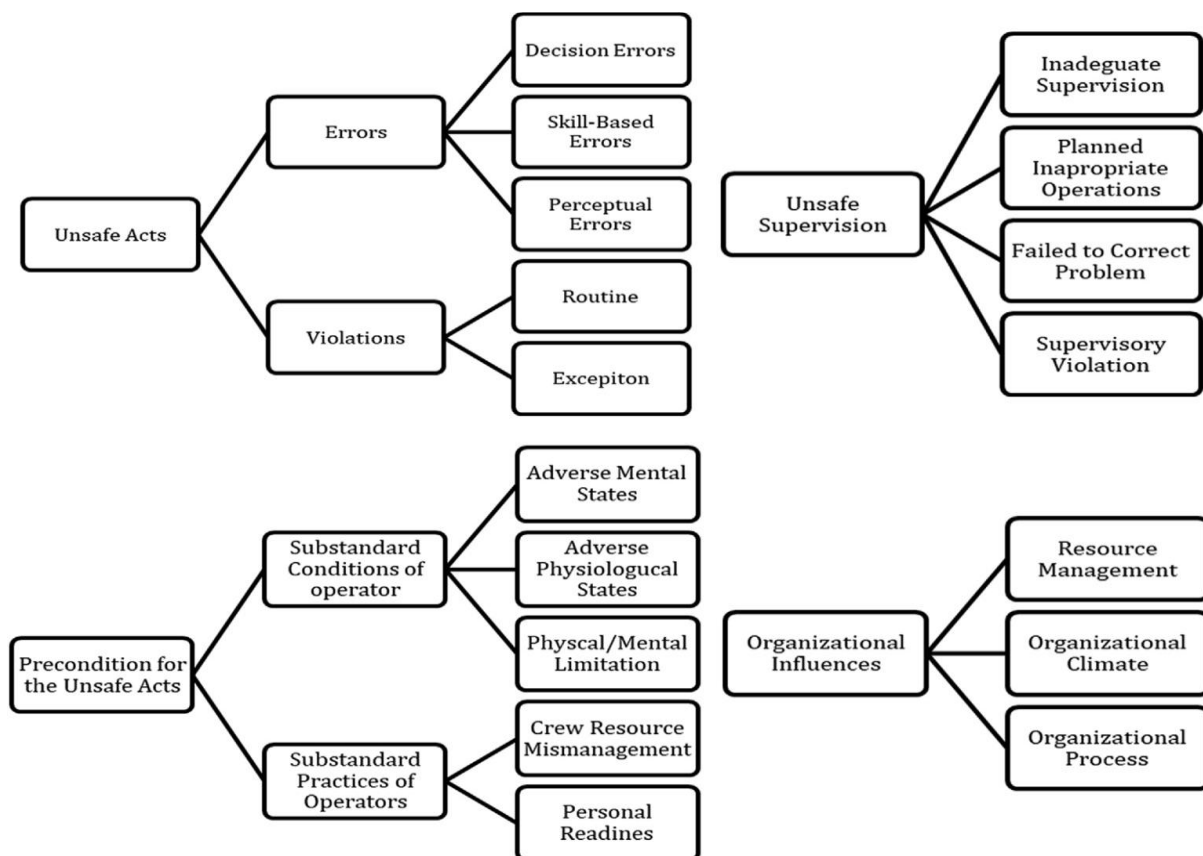

Fig 2: Taxonomy of causes classification.

Category	Description	Number of event
Not following Work Procedures	Workers performing without protective measures and dangerous posture while performing work	42
Non adherence of PPE	Worker performing activity without prescribed personal protective equipment	38
Defective PPE	PPE provided to the worker is damaged or defective	6
Obstacles in working area	Obstacles present in working area which can cause hindrance	19
Pathway obstruction	Materials present in gangway or pathway obstructing movement	7
Driving	Dangerous behavior during driving such as unauthorized operation, exceeding speed limits, not following procedures	5

Unauthorized use of mobile phone	Using mobile phone during work activity	12
Interference in work area	Interference caused by workers or vehicle passing through the area	3
Unfit equipment	Equipment not fit for operation or identified as defective	4

Table 1. Accident Precursors

IV. RESULT AND DISCUSSION

During the first phase of the study, we examined and categorised the factors into personal factors, human error factors, organisational factors and other categories. In the Tables 2 and 3 are presented categories of personal factors, human error, unsafe conditions, and organizational factors respectively.

Personal factors	Percentage
Using hands jewellery	4%
Talking while working	21%
Fatigue or tiredness	17%
Health of the person	6%
Lack of care or interest in doing their work	37%
The worker's inappropriate behaviour	47%
Personal problems	5%
Family problems	1%
Indiscipline	21%
Talking on the phone while working	11%
Drowsiness by not sleeping properly	7%
Recklessness	5%
Excessive intake of alcohol or drugs before reporting to work	1%

Table 2. Personal Factors

Human error	Percentage
Improper handling of heavy objects	24%
Trying to save time in developing their operation	9%
The operator does not respect rules and procedures safety	42%
Component on the floor	12%
Failure to follow work instructions (method)	37%
Disregarding security systems	11%
Overconfidence	37%
Distraction or carelessness of the operator to perform its task	23%
Workers play in workspaces	9%
Misinterpretation of work instruction	12%
Perform tasks without personal protective equipment (gloves)	33%
Manage the sharp terminal cable without gloves	1%
Do not use the right tool	18%
Remove with fingers stuck terminals	10%
Operating equipment without knowledge	19%
Work without safety guards in machines	7%
Unauthorized use of knives	2%

Table 3. Human Errors

V. CONCLUSION

The results of this study show that the majority of accident reports in the automotive industry are primarily related to the category of dangerous acts (human error). Associations between the types of human error contributing causal factors determined the existence of a significant relationship between violations and

unsafe conditions. This information helps to apply strategies to reduce human error and the factors that contribute to it, rather than general prevention strategies. From a safety culture perspective, the corporation is dominated by a human-centred approach, whose main characteristic is blaming the worker responsible for the accident. In this sense, it is recommended to work to create a culture with a focus on the system, where recognizing human fallibility and human error as a consequence instead of a cause approach is considered to be influenced by conditions in people.

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