

IMPLEMENTATION OF BEHAVIOR BASED SAFETY IN AN PUMP MANUFACTURING INDUSTRY**R. Senthilraja*, G. Arvinth*, K. Visagavel****

* PG Scholar, Department of Mechanical Engineering, Knowledge Institute of Technology, Salem, Tamilnadu

** Professor, Department of Mechanical Engineering, Knowledge Institute of Technology, Salem, Tamilnadu



Cite This Article: R. Senthilraja, G. Arvinth, K. Visagavel, "Implementation of Behavior Based Safety in an Pump Manufacturing Industry", International Journal of Advanced Trends in Engineering and Technology, Special Issue, October, Page Number 33-37, 2019.

Abstract:

A management is meant to have an commitment towards employees safety by means of identify hazards, to control risks and to measure effectiveness of mitigating actions. This paper is focused on safety management move toward in behavior based safety; it is a positive and physiological approach for accident prevention method, which incorporated among the employee and employer. The behavior based safety is a successful manner in safety management, which proven in American and European countries since 1980. Behavior is the one of the key factor for unsafe conditions and unsafe acts by improving the safety in behavior based approach would control the incident and improving the safety culture. Finally the consequences were clearly explained towards employees and involving the employees in various types of activities that promote them to be aware of unsafe act and unsafe condition available in the work floor. The BBS was implemented in various process and departments like an loading and unloading, fuel storage areas in an pump manufacturing industry to obtain the excellent target results. Hence it is concluded that that Behavior based safety implementation has given fruitful result in reduction of workplace injuries, promote injury free culture, enhance the proper usage of PPE and a safety promoted work culture in the work floor.

1. Introduction:

Many Industries are doing excellent work to improve their Occupational area by implementing various health and Safety (OHS) systems but they fail to capitalize on the promotional opportunity that this presents. Even though by implementing various health and safety system these firm cannot achieve their accident free work area. After doing many research they came to know that, The employees with proactive attitudes and behaviors towards health and safety which leads to better management of risk, and the overall reduction of illness, injury and property damage, which can able to promote an tremendous change in frequency rate, accident rate of the firm all these can be achieved by implementing behavior based safety and safety culture among workers.

Safety Culture:

Safety culture defined as "the way we do things around here" is that this not only includes, but appears to link culture directly to behavior. Safety culture includes attitude, values, norms, belief, that particular group of people share with respect to safety and risk. Safety culture implementation also includes implementing behavior safety among workers. It refers to the extent to which individuals and groups will commit to:

- Personal responsibility for safety
- Act to preserve safety
- Enhance and communicate safety concerns
- Strive to actively learn
- Adapt and modify behavior based on lessons learned from mistakes
- Be rewarded in a manner consistent with these values.

Behavior Based Safety:

Figure 1: Development of BBS

Behavior Based Safety (BBS) is a safety management practice that has originally been used in the process industry to improve the safety level on the work floor. It also improves the safety culture with the employees. Behavior-based safety (BBS) has been around for more than 30 years and is one of the most trusted employee-driven safety systems out there. Still, there are many misunderstandings about this tool and how best to use it. A process that creates a safety partnership between management and employees that continually focuses people's attentions and actions on theirs, and others, daily safety behavior. The points

below draw on our experience implementing BBS systems at more than 3,500 locations around the world. It focuses on what people do, analyses why they do it and then applies a research supported intervention strategy to improve people what to do. In a safety management system based upon the hierarchy of hazard control, BBS may be applied to internalize hazard avoidance strategies or administrative control. BBS is not an assumption, personnel feeling, and or common knowledge. BBS is not based on assumptions, personal feelings, and/or common knowledge. To be successful, the BBS program used must be based on scientific knowledge. Behavior based safety must also have attitude adjustment to be sustaining. It has been proven that “behavior influences attitude and attitude influences behavior”. The goal should be small gains over and over again; continuous growth. BBS is not quick fix. It is a commitment

Problem Identification: Each and every accident and incident that take place inside the firm occurs majorly due to “Unsafe Act & Unsafe Condition”.

Unsafe Act: Unsafe act is an act that deviates from the general recognized safe way or specified method of doing job which has high probability to cause accidents. Example: working under crane movement without wearing helmet.

Unsafe Condition: Unsafe condition is an unsatisfactory physical condition that exist at the workplace. Example: lifting heavy materials with a damaged tools.

Below listed are some of the unsafe condition found inside the firm:

- Working under EOT crane movement without wearing helmets.
- Lifting heavy components in an manual way.
- Not wearing provided PPE while carrying out spray painting process.
- Doing maintenance works while the machines are in ON condition.
- Removing provided guards for their comfortness.
- Working near the machines with loosen clothes.
- Handling chemicals without wearing PPE.
- Operating cranes without authorization.
- Welding process is carried out without wearing appropriate PPE's.
- Operating forklift above the speed limit.
- Not placing wheel stoppers under the vehicle while loading/unloading process takeout.

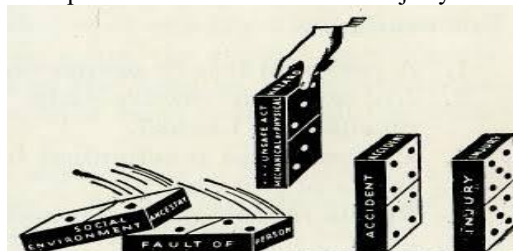
Hence the above problems are compressed to following:

- Non adherence of PPE.
- Adjusting & cleaning of machine in running condition.
- By passing the existing safety mechanisms (two hand buttons, photo sensors, limit switch, interlocks).
- Operating powered handling material equipment without equipment.

As said in domino theory, the accident that take place inside the work floor can be removed by avoiding both unsafe act as shown in below diagram.

Problem Identification:

Each and every accident and incident that take place inside the firm occurs majorly due to “Unsafe Act & Unsafe Condition”



Scope and Objective of the Project:

Scope of the project is to eliminate the unsafe behavior to develop safe environment .General unsafe behaviors exhibited from the employees are:

- Non adherence of PPE.
- By passing the safety systems provided.
- Operating machine in running condition.

Main objective of this project work is

- To develop accident free, safety culture in organization.
- To reduce the incident rate of the company.

2. Literature Survey:

James D. Westaby et al., [2005] developed and tested a new theory of behavior, entitled behavioral reasoning theory. The theory proposes that reasons serve as important linkages between beliefs, global motives, attitudes, subjective norms, and perceived control), intentions, and behavior. An underlying theoretical assumption in this framework states that reasons impact global motives and intentions, because they help individuals justify and defend their actions

Anne Richter et al., [2004] discusses about safety cultures, drawing on the differentiation, integration and ambiguity scheme introduced by scholars of organizational culture. An ethnographic approach has been applied in the study of meaning and symbols relating to work, hazards, occupational accidents and prevention

Douglas J. Myers et al., [2014] said that the concept of culture is now widely used by those who conduct research on safety and work-related injury outcomes. That as the term has been applied by an increasingly diverse set of disciplines, its scope has broadened beyond how it was defined and intended for use by sociologists and anthropologists.

Ching-Fu ChenPilo et al., [2013] safety behavior is viewed as a critical determinant of airline safety performance, and thus it is crucial to identify the factors which may enhance such behaviors.

3. Methodology:

This project deals with the promoting safe behaviour to develop injury free culture in the organization. The incident rate has been growing due to unsafe behaviors exhibited by the employees while working. While promoting the safe behaviors automatically the unsafe actions will decrease and the incident rate will come down.

Behavior Bases Safety Implementation:

Behavior underlies as a root cause for all the accidents. Hence, we are concentrating on behaviors of the employee. so we have to implement the behavior based safety to remove the unsafe conditions to produce an accident free working environment. The behavior based safety can be implemented by the provided following steps:

- Identify critical safety behaviour that contribute s to injuries and losses
- Observation over sometime period of identified behaviour
- Reinforcement is applied to increase desired behaviour
- Findings and feedback on the performance is presented for continuous improvement

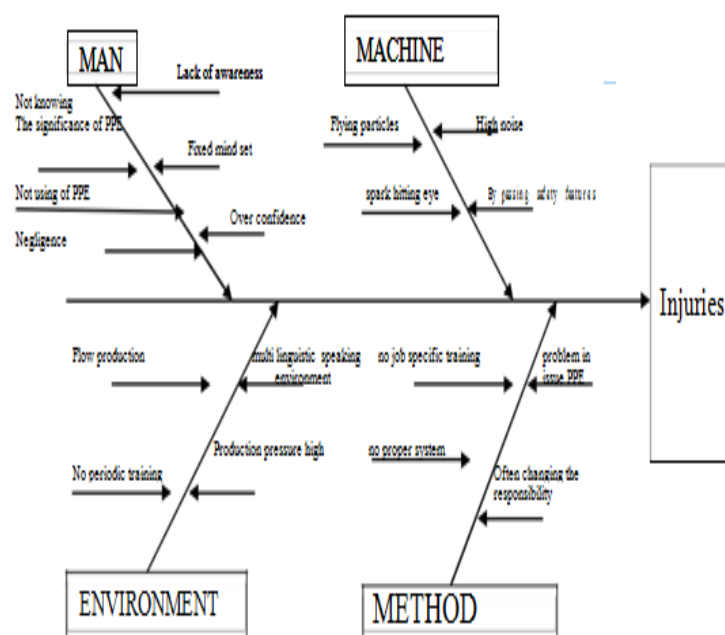
The identification of critical behavior can be analyzed using of the following techniques listed below: Analysis has been carried out to evaluate and find out the root cause for the stated unsafe behaviors. The following techniques are used:

- Cause & effect analysis
- Hazard identification and risk assessment control [HIRA].
- Human error assessment reduction technique [HEART]

Cause & Effect Analysis:

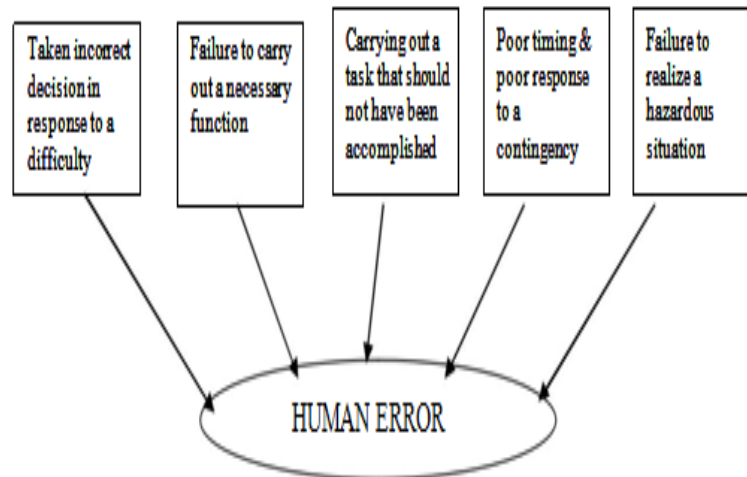
Cause & effect analysis is also known as fish bone analysis. It clearly represents the various causes and its effect which lead to injury. The fishbone diagram used to identify and list all the factors that are conditioning the problem at hand. This is primarily a group problem analysis technique, but can be used by individuals as well. The process is called fishbone Analysis because of the way in which the information gathered is arranged visually-like the skeleton of a fish. The probable causes for our problems are

- To complete the work faster
- No experience
- New operator
- High production pressure
- Team leader are not serious about safety
- Non adherence to PPE
- Unaware of real consequences.



Human Error:

Unsafe act is known as “Human error”. It occurs in the follow ways, as shown:

**Human Error Assessment and Reduction Technique (HEART):**

Human error assessment and reduction technique (HEART) is a technique used in the field of human reliability assessment (HRA), for the purposes of evaluating the probability of a human error occurring throughout the completion of a specific task. From such analyses measures can then be taken to reduce the likelihood of errors occurring within a system and therefore lead to an improvement in the overall levels of safety. There exist three primary reasons for conducting an HRA; error identification, error quantification and error reduction.

Behavior Based Training:

The commencement of BBS training program is essential that people at all levels receive the appropriate raining. Such a program incorporates a number of elements.

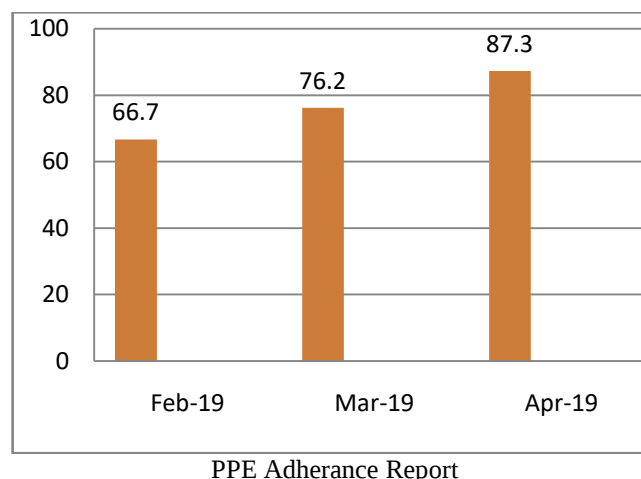
Raising the Safety Awareness:

This is the one the principle objectives of the training programme. Poster campaigns, targeting both safe working practices and the cause of accidents and ill health, should be used to raise awareness. Coaching line managers should receive proper frequent training coaching should be documented by the self-operating procedure.

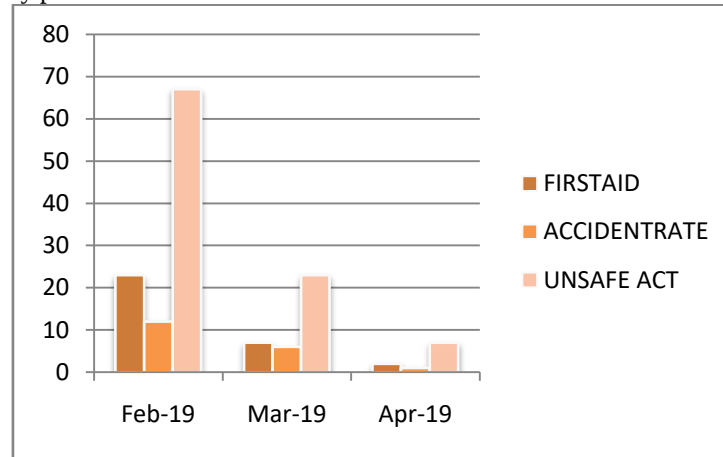
Reviewing the Consequences of Unsafe Behavior:

Regular feedback sessions are necessary whereby accidents arising from unsafe behavior are reviewed with the reference to the direct and indirect cases of those accidents. By the way no doubt that people learn from the others mistakes. Once the program has been established and it is necessary to monitor frequently. Similarly in the case of observers, they may lose heart if they see no action being taken following their observation. BBS is not based on assumptions, personal feeling, and/or common knowledge. To be successful, the BBS program used must be based on scientific knowledge. Behavior-based safety supplements other elements of an organization's safety. Additionally some safety measure carried out to implement behavior based safety are

- Induction Training
- Placing Safety Slogans
- Placing Safety Boards
- Placing Safety Policy
- Providing Safety Cards
- Safety Inboard/Training
- Mock Drill
- Motivation
- Rewards

4. Result and Discussion:

The incident rate was noted during the month of February, March and April the incident rate has come down due to elimination of unsafe behaviors. The employees started to wear the required personal protective equipment issued by management. The awareness level regarding safety has gone up among employees. The various promotional activities have been introduced and implemented in order to reduce the incident rate. The various promotional activities are cartoon competition, motivation through training; in house training, induction training, and modification of safety committee were improved. The incident rate and improved safety performance statistics was noted as the results can be seen in form of bar displayed below



Results after Implementing BBS

5. Conclusion:

Conclusion drawn for my project is that: By involving the management in BBS concept and behavior modification techniques, the incident in the month February, March and April has been reduced. Hence the incident rate also reduced gradually. Here by the BBS system acted as a successful tool for the management side to promote safety and PPE among workers. In future, these system can be developed continuously developed and monitored to have an injury free work floor as we need.

6. References:

1. James. D & Westaby (2005) 'Behavioral reasoning theory: Identifying new linkages underlying intentions and behavior' Organizational Behavior and Human Decision Processes, 97-120.
2. Anne Richter, Christian Koch (2004) 'Integration, differentiation and ambiguity in safety cultures' Safety Science 42, pp. 703-722
3. Douglas. J, & Myers (2014) 'Setting culture apart: Distinguishing culture from behavior and social structure in safety and injury research' Accident Analysis and Prevention, pp.25-29
4. Ching-Fu Chenpilo (2013) 'The impact of work accidents experience on causal attributions and worker behavior, pp.992-1001