STUDY OF OBSTACLES IN IMPLEMENTATION OF BEHAVIOUR BASED SAFETY SYSTEM IN AN INDUSTRY

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***Abstract*: The safety and protection of people, equipment and the environment are of serious concern in the engineering industries now a days. Many industries have recognized the need of Safe Work Environments and are progressively adopting Safety Management Systems to prevent hazardous events, avoid production & manpower losses and other fallouts that occur with industrial accidents. Safety management system also allows industries to improve employee knowledge of operations, enhance technical procedures, maintain accurate process safety information and increase overall facility productivity. Behavior-Based Safety (BBS) is an approach aiming at intervening and modifying human unsafe behaviors. This paper focus on the study of obstacles that arise in the implementation of Behavior Based Safety in an Industry and to analyze these obstacles and propose suitable methods to overcome these obstacles to improve the performance of BBS system.**

***Keywords*: Behavior Based Safety (BBS), Likert Scale, SPSS**

INTRODUCTION

One such system that many organizations have successfully used to reduce work place injury and illness is Behavioral Based Safety (BBS). BBS focuses on what people do, analyzes why they do it, and then applies a research-supported intervention strategy to improve what people do. As many scientific studies have concluded that unsafe behavior is a major cause of accidents, the BBS approach is drawing more and more attention in the area of occupational safety. On the other hand, workers safe behaviors could be reinforced when receiving positive feedback, incentive or reward.

Several studies have identified that BBS has several limitations or obstacles, which have hindered its effective implementation. Indian industries generally do not accord high priority to safety like the developed countries, barring some few industries. Many industries view safety as an inconvenience, as a cost rather than a benefit. The importance of good safety practice at work has not been properly understood by the Indian industries and thus they fail to reap the benefits of being safe. The industries do not aim at the best safety practice but only attempts to meet the minimum legal requirements on safety.

Behavior-Based Safety (BBS) is an approach aiming at intervening and modifying human unsafe behaviors.

LITERATURE REVIEW

Literature searches were conducted using the following databases viz, CUSAT Central Library and School of Engineering Library. The key words used were: "Behavior Based Safety", "obstacles in behaviour based safety", “Behaviour based safety in organisations” etc. "To keep the review to a manageable size, it was decided to concentrate solely on studies relating to the implementation of behaviour based safety in various industries. Articles from academic journals were retrieved. Additional information was retrieved from regulatory bodies, such as the Occupational Safety and Health Administration (OSHA), the National Institute of Occupational Safety and Health (NIOSH) which have conducted extensive studies. Internet searches were also carried out, with relevant websites noted and several articles downloaded. Other articles were chosen from the reference lists contained in some of the more general review papers. The purpose of this chapter is to present a way to identify the obstacles for implementation of BBS in an engineering industry.

M Zhang and D Fang (2013) states that, despite successful implementations, BBS approach is currently facing a critical difficulty in achieving persistent intervention effect. Some studies suggest that safety performance declined after intervention was removed. They say that due to dynamic and transitory nature of sites and workforce, it is more difficult challenge to achieve implementation in a construction industry. They developed a Supervisory-Based Intervention Cycle (SBIC) and a Behavior-Based Safety Tracking and Analysis System (BBSTAS) to achieve the integration at site and organizational level respectively.

L.H Kaila (2006) defined the features of BBS which includes concepts, observation and feedback process and implementation and steering committee. Some of the obstacles that are foreseen when one implements BBS in an organization has been cited with

various problems in observation and giving feedback and the reasons for failure in implementation. Some of these problems were inadequate time to observe, lack of patience, observer not allowing observe to speak, lack of patience etc.

PROBLEM IDENTIFICTION

Behavioral Based Safety involves a systematic and continuous strategy whereby employees volunteer to observe their peers' work activities and identify unsafe behaviors so that improvements can be discussed, implemented and once again observed. Workers on the front line are the most likely to have an accident, and have traditionally been un-involved in safety management whereas behavioral safety brings them right into the thick of it.
The behaviors to be observed are identified by analyzing historical accident reports which are likely to show that a small number of risky behaviors cause the greatest number of accidents. Workplace factors which may trigger such risky behavior such as rewards and punishments are identified (e.g. it's uncomfortable to wear eye protection). It's important to get to the bottom of 'why' employees may be behaving unsafely, and much of that is embedded in the culture of the company, re-emphasizing the need for a holistic approach which includes both management and employees.
Metrics are used to clearly show improvements in behavior or to encourage safer behavior and positively re-enforce the strategy.

Three forms of feedback are used to overcome apathy and encourage continuous improvement:
Verbal feedback at the time of observation
Graphical feedback throughout the workplace
Tabulated feedback for weekly discussion

While Behavior Based Safety offers benefits such as discouraging unsafe and encouraging safe behaviors and involving employees in the process, when implemented incorrectly, it can cause major issues. These include pointing the finger at the behavior of the employee while an improvement in the workplace environment, the process, the tools, the materials or in many cases better training could in fact be the root cause of the issue. The continuous pressure exuded on employees to 'behave safely' can also have the opposite effect as the employee may see no value in the safe behavior. If there was no accident when they behaved like these many times before, why will there be one now?

All in all, 'fixing' employees' behavior within a broken culture is never going to work. According to Ron Bowles, director of operations for Portland, Ore.-based Strategic Safety Associates the key to true, positive behavior change "is to create an environment where, rather than have safety as something that is being done to me or for me, it's something that's being done with me or by me. Once I begin to own it, I can have incredible success."

The challenge of safety professionals is to find a way to make employees self-accountable for their own and their colleague's safety. Forcing behaviors takes that power to change right out of their hands.

Behavior Based Safety can in fact be a success, but management must first tick a few boxes. Safety performance needs to be planted in the heads of every worker, contractor and manager as a core value of the company. It needs to be built into systems, machinery, processes, investments, communications and the core architecture of the company. Employees should be shocked if a colleague is cynical or disengaged. A behavior-based approach to safety has the potential to be a success so long as management, employees and contractors trust and have confidence in one-another to whole-heatedly embrace it as an attitude rather than a discipline.

METHODOLOGY

This chapter gives the methodology used in this study. The study design, data collection instrument, study population, inclusion and exclusion criteria, data collection technique and the various analysis done using the data are briefly explained in this chapter.

4.1 STUDY DESIGN

A survey method is the research strategy adopted in the current study. This method was adopted to obtain the relevant data, which would allow the researcher to identify the potential obstacles that can hinder the effective implementation of a BBS system

4.2 DATA COLLECTION INSTRUMENT

Questionnaire forms were used for answering and addressing the objectives of this study. The various obstacles identified were mostly related to either workers or management and in some cases both. So the obstacles were sorted and shortlisted for easier analysis.

4.2.1 Likert Scale

A Likert scale is a psychometric scale commonly involved in research that employs questionnaires. It is the most widely used approach to scaling responses in survey research, such that the term is often used interchangeably with rating scale, or more accurately the Likert-type scale, even though the two are not synonymous. When responding to a Likert questionnaire item, respondents specify their level of agreement or disagreement on a symmetric agree-disagree scale for a series of statements. Thus, the range captures the intensity of their feelings for a given item. A scale can be created as the simple sum of questionnaire responses

over the full range of the scale. In so doing, Likert scaling assumes distances between each item are equal. Importantly, all items are assumed to be replications of each other or in other words items are considered to be parallel instruments.

4.2.2.1 SPSS

SPSS is a computer application that provides statistical analysis of data. It allows in-depth data access, analytical reporting, graphics and modeling. It can perform standard analysis including descriptive statistics, exploratory data analysis, correlations, a variety of regression, general linear modeling (including ANOVA) etc. In the current study, ANOVA was used to compare the scores of respondents.

4.2.2.2 Microsoft Excel

MS Excel is an electronic spreadsheet program that can be used for storing, organizing and manipulating data. It has many inbuilt formulas and functions for statistical analysis including charts and graphs.

4.3 STUDY POPULATION

Industry identified was Cochin Shipyard Ltd. Target population includes workers of CSL whose age group varies from 20 years to 60 years. The researcher approached the management of Cochin Shipyard Ltd and requested permission to administer the surveys amongst welders, fitters, crane operators, supervisors, engineer trainees, helpers, riggers etc. Permission was granted for conducting the surveys.

4.4 INCLUSION AND EXCLUSION CRITERIA

4.4.1 Inclusion Criteria

4.4.2 Exclusion Criteria

4.5 DATA COLLECTION TECHNIQUE

Standardized and pre-validated questionnaires to be filled with a simple marking method were distributed among workers. Adjustments were made for English not being the first language of most workers, so the researcher converted and included local language Malayalam in to the questionnaire for the ease of the workers. The instrument was translated into Malayalam by an experienced person who was fluent in both English and Malayalam. Care was taken to ensure each item translated retained a meaning as close as possible to the original version by means of a back translation process.
The questionnaire contains three parts; the purpose of the first two parts is to establish the background of the organisation, and its status with regard to safety management. While part three focuses on Behaviour Safety, address the specific research aim, “what can employers do to influence workers behavior towards safety on site”.
Bleow are the points of questioner:

Part 1 - General Information The purpose of questions 1-3 is to get details from the respondents in order to categorise them accordingly in accumulation of research results.
Question 1 determines the position by job title of the respondent, while questions 2 and 3 ask about the size of the organisation, the staff turnover and the type of construction activity in which they are involved.
Question 2, employee turnover is particularly relevant to the current research as having a high employee turnover has been linked to difficulties with change or improvement initiatives, and is a particular problem in the construction industry, according to (Murray 2006, Biggs et al 2005 and Mattila, Hyodynmaal988).
Question 3, requires participants to indicate the type of construction work in which they are involved, in order to compare any similar results or trends that may emerge per construction type. In addition different ‘build types’ may have different risks, management styles, influences etc.
Questions 4 and 5 are both included to explore the influence of organisational factors (as in Reasons Accident Model, chapter 2). While question 4 is also included to examine the drivers for managing safety in the organisation, question 5 explores their level of compliance with the main legislative requirements for the construction industry.

Part 2- Accident History- contains question numbers 6 and 7 relating to the five year accident history. The researcher felt it was important to put a definite timeframe on the question, ensuring all responses related to the same timeframe. Five years was chosen by the researcher as a sufficient period of time to meet the requirements of this research
Question 6 establishes the number of accidents and dangerous occurrences that occurred in this time.
Question 7 asks about the type of accident most common, the options presented in question 7 are those used in the HSA summary statistics 2004 - 2005 (H.S.A 2006(a)) which were used to compare findings to national statistics. A rating scale was used in this question as a means of establishing the most common accident type.

Part 3 - Behavioural Safety, comprising of eight questions it is the longest section of the questionnaire, is different from the other sections as it has one open question. Key to the achieving the aim’s of this thesis, this part of the questionnaire is designed to fulfil the research question which was.
‘What if anything can organisations to influence behaviour towards safety on site? ’

Question 8 asks participants to identify the top 5 contributory factors to accidents in their organisation. This an opinion type question and a subjective measurement of contributory factors, the rating scale method was chosen, to allow ranking of opinion. Time Pressure on the job
Participants were also prompted to include other contributory factors, providing the freedom to answer outside of the closed question.
Question 9 is included to fulfd the research aim, 'to conduct attitudinal research on the ability of organisations to influence workers behaviour'. Respondents are asked to rate the ability of their organisation to influence workers behaviour, with options ranging from having a 'good ability' to having 'no influence'.

Question 10, investigates the factors that influence behaviour, seeking the opinion of management on which factors are the most influential. The rating method is again chosen as means of obtaining this subjective information in order of priority.
Question 11 focuses specifically on individual behaviour as a contributor to construction industry accidents. Getting the opinion of management on the level of its contribution as is an aim of this research. Three options were presented 'some extent' 'a major causation factor' and 'not at all'.
Question 12, refers to the findings of (McDonald, Hrymak pg 69) where 'the presence of a safety representative is the only factor which is significantly related to safety behaviours' the researcher wanted to probe management reaction to this finding, believing that the potential positive influence that this demonstrates is underestimated in the industry at large, and safety representatives are a valuable resource that is not effectively used.
Question 13 refers to the behaviour change model of goal setting, reinforcement and feedback as used in previous studies by Duff et al 1993, Murray, P 2006, Mattila, Hyodynmaa 1988. The purpose of this question is to determine if construction companies have any faith in applying such models in their organisations.
Question 14 is the only open question of the survey, its purpose being to allow management express their own ideas on what can be done to influence workers behaviour towards safety. The reason for positioning this question at the end of the questionnaire is to ensure the respondent understands the concept of Behavioural Safety, and at this stage allows there thoughts to roam freely outside the 'closed' restricted question type.
Finally Question 15 investigates the willingness of construction site management to partake in a pilot study on behaviour safety. The reason for this question is to determine if any real interest exists and to fulfil the aims of this research, which 63investigated how behaviour based safety models would be received by the Irish Construction Industry.

RESULTS AND DISCUSSION

In this chapter the results of the statistical analysis are given. Workers are grouped by age, education, experience, job position etc. Analysis of variances is used to compare the total score among different demographic groups such as age, education, experience, job position and accident incident as mentioned below:

The questionnaire containing six factors Management Commitment, Management Involvement, Management Accountability, Workers Commitment, Workers Involvement and Workers Accountability were analyzed by SPSS V20. Since each factors consists of different no of queries, the total score computed has been converted to percentage. So the maximum score that can be obtained becomes 100.
According to the graph Management Commitment has a score of 76.5. Management Involvement scored 75 while Management Accountability has a score of 76.9.
Workers commitment gives a rating of 83.6. Workers Involvement is by far the lowest with a score of 68.3. Workers Accountability has a score of 78.1.
All the six factors except workers involvement scored above 75.

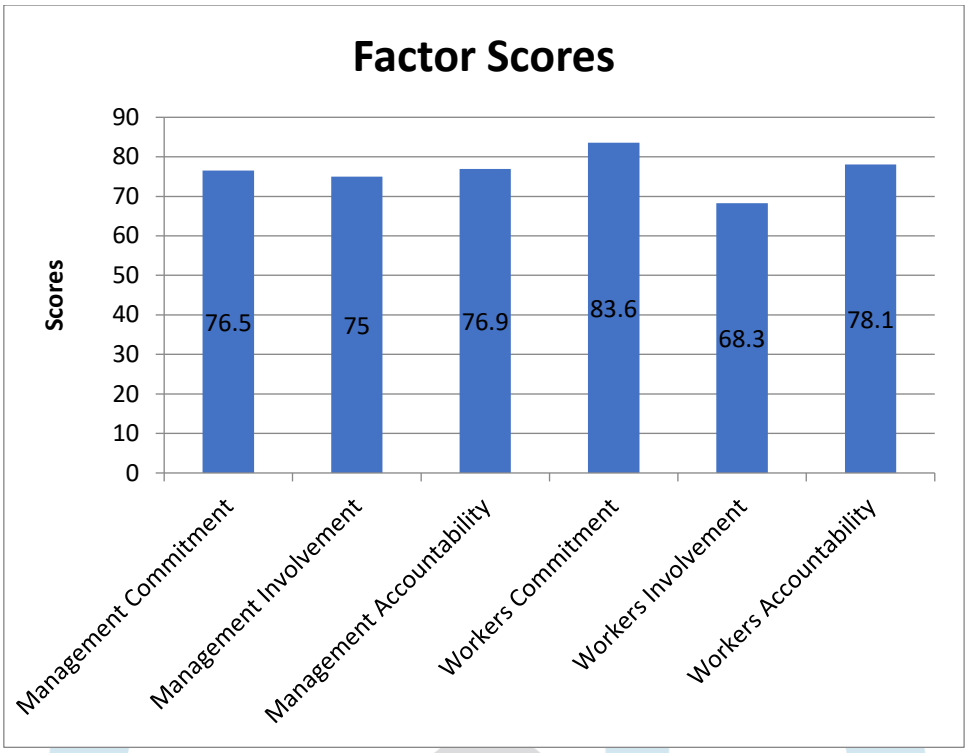

Figure 1 : Overall Scores vs Factors

Even though Workers Commitment scored the most at 83.6, their involvement has the least score at just 68.3. The researcher clearly thinks that workers are all talks and no action. That is they clearly understands the importance of safety but they don't follow it. They should be more cautious and attentive while working. None of the Management factors scored above 80. Their scores are satisfactory; in fact the researcher certainly believe that management involvement is at the boundary at a score of 75. Only better involvement from the part of management can increase and the involvement of workers and improve their safety aspects.

CONCLUSIONS & SCOPE OF FURTHER WORK

6.1 CONCLUSIONS

The results of the analysis revealed that Workers Commitment is the main obstacle that can arise in the implementation of BBS in CSL ltd. Further need for improvement is visible among the scores of three management factors Commitment, Involvement and Accountability.

The study shows a significant cyclic pattern is followed for the workers perception towards safety in terms of age. Further analysis of accident incidents can bring forth the real reason for the cyclic pattern. But in terms of experience, the safety awareness deteriorates as they gain experience.

The most experienced group scored the lowest score of 78.78. According to the study as the technical know-how increases, respondents have better awareness to safety aspects. These can be seen in the findings where the total score increase along with the technical qualifications as respondents with Diploma scored 82.31.

As in most cases respondents yet to be in an accident scored highest with 83.29. Another unusual pattern is found where respondents with minor injuries having better score than respondents with near miss There is further scope for research in this area as to why so.

6.2 RECOMMENDATIONS

The data gathered from the study indicates that Workers involvement is the main obstacle at CSL ltd. Therefore significant improvement is needed in the involvement of workers for Successful implementation of BBS.

The researcher felt that information received by the organization on health and safety was presented in a way that was not always understandable by the employees. Researcher felt there was a vast amount of information to absorb and to find what was most relevant to their circumstances and that it had to be simplified for any effort to improve their involvement. The information received needed to be relevant to the work in their sector as time could be wasted going through information that has no relevance to their organization. They also stressed that it should be simplified.

The researcher believe that if the workers were to take on the responsibility of having a health and safety role in addition to the job they were already doing, they would need a time allowance to do these extra duties.

Taking on a health and safety role should lead to promotion or, at least, the chance of advancing more quickly within an organisation. This was a further incentive to encourage a greater number of people to get involved. Another way is to put forth an observation book, to encourage workers to record any unsafe working practices and hazardous areas. An anonymous suggestion book so employees can record their ideas for making the workplace safer.

Researcher feels that written information, whether paper or electronically based was not the best way of communicating information, increasing awareness of the issues, or of encouraging employees to become involved in health and safety. Training events and staff meetings were identified as better ways of disseminating information. So weekly tool box talks should be conducted , accompanied by a signed commitment to working safely for the following week.
The researcher had gone through a number of examples where inspections had helped organisations to keep health and safety in the minds of staff at all times, around the safety of the customers/clients and the staff. Inspections shall be conducted at regular intervals.

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