



A STUDY ON BEHAVIOR BASED SAFETY MANAGEMENT

(With Reference to Visakhapatnam Steel Plant, Visakhapatnam)

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ABSTRACT

The industrial revolution and the consequent industrialisation have brought in lot of hazards and risks to the industrial workers. Every year millions of industrial accidents occur causing immense suffering to the accident victim, their family and enormous loss to the organization and ultimately to the nation. The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of an organization's health and safety management.

Behavior Based Safety is the "application of science of behavior change to real world problems". Behavior Based Safety "focuses on what people do, analyzes why they do it, and then applies a research-supported intervention strategy to improve what people do". To be successful a Behavior Based Safety program must include all employees, from the CEO to the floor associates. To achieve changes in behavior, a change in policy, procedures and/or systems most assuredly will also need some change. Behavior Based Safety is not based on assumptions, personal feeling, and/or common knowledge. Focusing on workgroups, in static settings was demonstrated to be the most efficient at behavior change and injury reduction. This paper focus on safety management to identify the need for implementation of Behavior Based Safety to enhance total safety culture at Visakhapatnam steel plant, Visakhapatnam.

KEYWORDS: Behavior Based Safety, Need, Objectives, Methodology, Analysis, Findings, Suggestions and Conclusion.

INTRODUCTION

Organisations are becoming increasingly aware of the need to provide a workplace that is not only free of common injuries but one that also protects workers, facilities and the environment from the consequences of more serious incidents involving safety, security, environmental and other risks. The industrial revolution brought in new inventions of machines and techniques of production which changed the ways of man's living and thinking throughout the world. The industrial revolution and the consequent industrialisation have brought in lot of hazards and risks to the industrial workers. The advancement in science and technology have paved way for more and more complex and hazardous industries which further increase the risk to the industrial workers. Every year millions of industrial accidents occur causing immense suffering to the accident victim, their family and enormous loss to the organization and ultimately to the nation.

Considering the human sufferings and economical loss due to accidents, it becomes imperative on the part of every one to prevent the accidents by removing or controlling the hazards in industries. Despite advances in accident prevention and providing safe and healthy environment to the industrial workers, safety at work still needs to find a complete solution. Accident prevention does not lie on devising safe machines alone but also on improving the knowledge, skill, attitude, behavior and morale of the industrial workers.

Current safety culture assessment techniques identify general organisational strengths and weaknesses, which are not usually directly linked to specific behaviors. This can limit the identification of specific behaviors which need to be adopted or promoted to enhance a positive safety culture. Furthermore, the specific behaviors required to promote a positive safety culture are likely to vary over time and between organisations. It is therefore often necessary for an organisation to further analyse the results of their safety culture measurement processes in order to identify the specific behaviors required to promote or maintain a positive safety culture. Once these behaviors have been described, one way to promote them is via a behavioral safety programme. Safety culture consists of values, attitudes, perceptions, competencies and behavior of the people that make up the organization.

The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of an organization's health and safety management. Safety culture consists of values, attitudes, perceptions, competencies and behavior of the people that make up the organisation. In an organisation with a positive safety culture there are high

levels of trust; people agree that safety is important and that safety management systems are effective. The identification of a poor safety culture as a factor contributing to the accident led to a large number of studies investigating and attempting to measure safety culture in a variety of different high-risk, high-hazard industries. Therefore a research study on safety management to identify the need for implementation of Behavior Based Safety to enhance total safety culture at Visakhapatnam steel plant is attempted.

CONCEPT OF BEHAVIOR BASED SAFETY MANAGEMENT

Behavior Based Safety (BBS) is defined as the process that identifies & corrects the “At-Risk Behaviors” and positively reinforces “Safe Behaviors” in individuals.

Behavior is variously defined as:

- How a person conducts himself;
- The demeanor and manners of an individual;
- An observable action of a person.

Behavior refers to the actions of a system or organism, usually in relation to its environment, which includes the other systems or organisms around as well as the physical environment. It is the response of the system or organisms to various stimuli or inputs, whether internal or external, conscious or subconscious, overt or covert and voluntary or involuntary.

Human behavior is the population of the behaviors exhibited by humans and influenced by culture, attitudes, emotions, values, ethics, authority, rapport, hypnosis, persuasions, coercion and or genetics.

The behavior of people (and other organisms or even mechanisms) falls within a range with some behavior being common, some unusual, some acceptable, and some outside acceptable limits. In sociology, behavior is considered as having social behavior, which is more advanced action, as social behavior is behavior specifically directed at other people. The acceptability of behavior is evaluated relative to social norms and regulated by various means of social control.

Controlling of unsafe behavior

Unsafe behaviors of human beings can be controlled by the following approaches

1. Elimination of hazards by engineering controls
2. Changing of people attitudes
3. Punishment to people
4. Praising people

5. Implementation of Behavior based safety system

The phrase "Behavior Based Safety" was coined by Dr. E. Scott Geller of Safety Performance Solutions (SPS) in 1979. Dr. Geller and his colleagues continue to implement Behavior Based Safety around the world. Over time, Behavior Based Safety became the catch phrase of the safety systems industry. Traditionally BBS has been used in industrial settings. A new generation has found success using BBS in office/lab settings as well.

To any organization Behavior-Based safety management provides a convenient means to understand the required safety performance, rate their safety culture, psychological aspects of safety, individual differences, behavior as function of self and situation, perception of danger and acceptance of risks, knowledge and responsibility namely, the safety performance.

Behavior-Based safety management, focuses on the identification and modification of critical safety behaviors, and emphasizes how such behaviors are linked to workplace injuries and losses. Behavior Based Safety is a process that reduces unsafe behaviors that can lead to incidents occurring in the workplace. The process works by reinforcing safe behavior and identifying the causes of unsafe behavior. Behavior-Based safety management also discusses the future directions or strategies for improving the management of workplace safety.

The concept of the BBSM will not proceed in a uni-dimensional mode. The psychological aspects of organizational safety are varied and its functional at many levels of complexity requires a very refined approach to its manipulation. Traditional safety has been thought to be especially applicable to the reduction of injuries; its approaches were thought to be relevant primarily in convicting people to follow common sense hazard avoidance rules and to correct patent causes of injury.

NEED FOR THE STUDY

The review of literature on Behavioral Based Safety in various organizations shows that different authors and researchers examined the concept from different dimensions. Behavioral research on learning teaches us powerful lessons about how to teach and build performance improvement on safety. Many companies have spent a lot of time and effort improving safety, usually by addressing hardware issues and installing safety management systems that include regular line management safety audits.

Over a number of years these efforts tend to produce dramatic reductions in accident rates. Often, however, a plateau of minor accidents remains that appears to be stubbornly resistant to all efforts to remove them. Although many of these are attributed to peoples'

carelessness or poor safety attitudes, most of these are triggered by deeply ingrained unsafe behaviors. Behavioral Based Safety addresses these by making use of proven management techniques which almost always results in a positive step change in safety performance and safety attitudes.

A substantial number of workplace accidents are instigated through unsafe Acts and the unsafe conditions created by the employees in the work place. The employers need to be aware that further reducing accidents can only be achieved by identifying, examining and focusing upon such unsafe behavior or the At- Risk behavior. The steel industry is unique in the sense that it is capital intensive as well as labor intensive process with technology mix available in the industry. Steel making being a complex process, the people operating and maintaining the process have to be motivated.

The review of literature reveals that there is no enough research evidence from India about a comprehensive study in the area of Behavioral Based Safety has been taken up in the specific sense of a multi-unit integrated steel plant in the public sector in India. So far no study has been taken up on accident prevention and safety measures with a special reference to Behavioral Based Safety in Visakhapatnam Steel Plant. The review of earlier studies also indicates a perceptible research gap in this area.

In view of the above, a modest attempt is made to study the safety management to identify the need for implementation of Behavior Based Safety to enhance the total safety culture at M/s. Visakhapatnam Steel Plant, RINL, Visakhapatnam. The study broadly envisages an evaluation of the safety measures in Visakhapatnam Steel Plant and will also help significantly in formulating policies towards improving the accident prevention and safety measures in the company which in turn leading to the target of “Zero Accident” and increased productivity. Hence it is hoped that this study will fill in that gap and provide the much-needed organizational relevance to academic research.

OBJECTIVES OF THE STUDY

1. To study and understand the Behavioral Based Safety Management and its relevance to the industries in India.
2. To study the international perspective on Behavioral Based Safety Management.
3. To study the profile of steel industry in global, domestic and Visakhapatnam Steel Plant in particular.
4. To study the Safety Management Practices, the causes of various accidents and assess the Safety Culture prevailing in Visakhapatnam Steel Plant.

5. To analyse the perceptions of the respondents from the various levels of employees in Visakhapatnam Steel Plant in order to understand the existing safety management practices.
6. To suggest strategies and action programmes for further enhancement of the Safety Culture by implementation of Behavioral Based Safety Management at Visakhapatnam Steel Plant.

METHODOLOGY

The process of gathering reliable and meaningful information is the cardinal aspect of the enquiry that forms a central link in the operational plan for the entire research design and is vital to draw valid conclusions. The present study is based on both primary and secondary data. The study entailed a good deal of preparation and planning in order to secure the necessary updated data and information. Keeping the objectives of the study in mind, the following methodology has been adopted for conducting the present study. Critical study of the various Safety Management System elements of Visakhapatnam Steel Plant was made by personal discussions, perusal of records and plants inspection by walk-through survey to arrive at technically feasible conclusions. The observations were prominently taken for assigning weightages to various components of a comprehensive safety management system. Information was collected from various sources that include records, certificates and relevant documents. The data was verified at site for their implementation. In order to get further clarifications, discussions were held with all the concerned representatives of the Safety department, Safety Committee members of the various departments and other departments' Managers and workers.

Primary Data

The content of the primary data is gathered from the employees through a structured Questionnaire aimed at various aspects as a part of the study. Qualitative data were gathered from informants focusing on the following six main dimensions measured in the questionnaire study:

1. Safety Commitment
2. Safety Compliance
3. Safety Awareness / Communication
4. Safety Behavior
5. Stress Recognition

6. Teamwork

A well structured questionnaire was used for collecting data from target respondents, processing and analyzing the data and arriving at conclusions. The respondents forming an integral part of the source of primary data are the Executives from Junior Manager (E0 Grade) to General Managers (E8 Grade) and the Non-Executives at various levels who are working in the different departments of Visakhapatnam Steel Plant, Visakhapatnam.

The researcher administered the questionnaire to the respondents figured in the sample, based on the prior appointments he consulted directly and distributed the questionnaire for the executive cadres whereas for the non-executive cadres he was present when each respondent was answering the questionnaire and saw that the respondents answered on their own and did not consult any one. The respondents were apprised of the purpose of the study and they were given time to answer the questionnaire.

Secondary Data

The content of the secondary data required for the study is obtained from various earlier studies in the relevant field, journals, magazines, text books, various Safety Reports from the intranet portal of SED, accident statistics and investigation reports, safety audit reports, safety inspection reports, annual reports, Steel Industry (JCSSI) report records, and personal manual of Visakhapatnam Steel Plant.

Sampling

The universe for the present study is a Public Sector Undertaking (PSU) located at Visakhapatnam. It is largely manpower intensified and holds 14,703 permanent employees in this unit. There are different cadres in the organization like below supervisory level, front line managers, middle management and higher management etc.

Selection of sample

The study has taken into consideration Executives and Non-Executives employees working in Visakhapatnam Steel Plant. All the major production departments are selected for the study. Out of total 14703 permanent employees a sample of 164 executive employees and 218 Non-Executive employees are selected for the survey. All the population of Visakhapatnam Steel Plant divided into different stratus based on the activities of production and from each stratum the respondents have been chosen on stratified sampling basis. For below supervisory level and supervisory level the researcher used systematic random

sampling method to collect primary data through questionnaire whereas for the middle management and Head of the departments the researcher used simple random sampling technique. Thus total samples of 382 respondents are surveyed.

Hypotheses

The following hypotheses are formulated for testing the relationship between the variables.

1. Cadre has no significant impact on all the dimensions related to Safe / unsafe behavior.
2. There is no significant relation between the dependant variables' dimensions and the independent variable number of dependants.
3. Educational qualification has significant collision with all the dimensions.
4. There is no significant relation among the independent variable age with each and every other dimension.
5. There is no significant change in the opinion of the respondents on all the dimensions related to safe / unsafe behavior with their respective salary.
6. The opinion of the respondents has no effect on the variables with respect to income.
7. There is no significant average difference in the opinion of the respondents belongs to different positions with regard to all the dimensions related to safe / unsafe behavior.
8. Nature of job does not play a vital role on all the dimensions related to safe / unsafe behavior.

ANALYSIS

Analysis: The following Table (1) describes the average values and the standard deviation values of each and every dimension related to the Safety Culture that prevails in Visakhapatnam Steel Plant.

Table 1 Descriptive Statistics of the Dimensions

Dimensions	Mean	Std. Deviation
Safety Commitment	.6470	.66044
Safety Compliance	.7048	.66441
Safety Awareness / Communication	.6529	.68219
Safety Behavior	.8887	.65824
Stress Recognition	.6245	.55809
Team Work	.8413	.74422

Source: Field Study

The average value of safety behavior (0.887) is greater than the remaining dimension followed by team work (0.8413) which divulges that on these two dimension respondents' opinion is more positive than the remaining dimensions. All the questions correlate fairly well and none of the correlation coefficients are large in particular.

Table -1. Correlation Matrix of the Dimensions

Correlation Matrix^a

		Safety Commitment	Safety Compliance	Safety Awareness / Communication	Safety Behavior	Stress Recognition	Team Work
Correlation	Safety Commitment	1.000	.751	.646	.493	.510	.602
	Safety Compliance	.751	1.000	.713	.634	.577	.641
	Safety Awareness / Communication	.646	.713	1.000	.649	.577	.766
	Safety Behavior	.493	.634	.649	1.000	.664	.712
	Stress Recognition	.510	.577	.577	.664	1.000	.695
	Team Work	.602	.641	.766	.712	.695	1.000
Sig. (1-tailed)	Safety Commitment		.000	.000	.000	.000	.000
	Safety Compliance	.000		.000	.000	.000	.000
	Safety Awareness / Communication	.000	.000		.000	.000	.000
	Safety Behavior	.000	.000	.000		.000	.000
	Stress Recognition	.000	.000	.000	.000		.000
	Team Work	.000	.000	.000	.000	.000	

a. Determinant = .015

Source: Field Study

Analysis: The above Table (2) is an abridged version of the R-matrix. The top half of this table contains the Pearson correlation coefficient between all pairs of the factors whereas the bottom half contains the one-tailed significance of these coefficients. We can use this correlation matrix to check the pattern of relationships. First scan the significance values and look for any variable for which the majority of values are greater than 0.05. Then scan the correlation coefficients themselves and look for any greater than 0.9. If any are found then there is a problem of singularity in the data and we have to remove those variables. The determinant of the matrix of this data is 0.015 which is greater than 0.00001. So multicollinearity is not a problem for this data. To sum up, all the questions correlate fairly well and none of the correlation coefficients are large in particular; therefore no need to consider eliminating any questions at this stage.

Table-3. Communalities of Extraction

Communalities		
	Initial	Extraction
Safety Commitment	1.000	.629
Safety Compliance	1.000	.738
Safety Awareness / Communication	1.000	.756
Safety Behavior	1.000	.682
Stress Recognition	1.000	.635
Team Work	1.000	.777

Extraction Method: Principal Component Analysis.

The above Table (3) shows the communalities of extraction. Principal component analysis works on the initial assumption that all variance is common; therefore in initial the communalities are all 1. The communalities in the column labeled extraction reflect the common variance in the data structure. So, for example, we can say that 62.9percent of variance associated with safety commitment is common or shared variance. Another way to look at these communalities is in terms of the proportion of variance explained by the underlying factors.

Table-4. Eigen values of each factor represent the variance

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.217	70.291	70.291	4.217	70.291	70.291
2	.644	10.728	81.018			
3	.389	6.478	87.497			
4	.333	5.548	93.045			
5	.235	3.918	96.963			
6	.182	3.037	100.000			

Extraction Method: Principal Component Analysis.

Source: Field Study

The Eigen values associated with each factor represent the variance explained by that particular linear component and also display the Eigen value in terms of the percentage of variance explained so factor 1 explains 70.291 percent of total variance. It should be clear that this factor explain relatively large among the variance. There is only one factor among all with Eigen value greater than 1. Therefore there is only one factor extracted.

Table-5 Opinion on the Dimension “Safety Commitment”

S.No	Statements on Safety Commitment	SA	A	N	D	SD
1	Our management visibly demonstrates an interest in the safety and health of their employees	34	48.4	11.8	3.4	2.4
2	All the required PPEs (Personal Protective Equipments) like safety shoes, helmets, goggles, gloves, etc. for my job are always available.	42.7	40.8	10.2	3.9	2.4
3	The health and safety training program offered by my organization meet my needs.	27.2	49	15.2	6.3	2.4
4	The Safety audits / inspections of my section / department are conducted at regular intervals.	19.6	42.4	20.7	11.5	5.8
5	The Safety Committee of my department is an active and result oriented group.	14.1	41.9	25.4	12.6	6
6	Senior Managers seem interested in health and safety before an incident / accident happens.	8.1	22	23.6	32.2	14.1
7	I am satisfied with the investigation and follow-up measures after incidents and accidents have taken place.	12.8	46.6	26.2	9.2	5.2
	Average Percentage	22.64	41.59	19.01	11.30	5.47

SA-Strongly Agree, A- Agree, N-Neutral, D - Disagree, SD - Strongly Disagree

Source: Field Study

Analysis: The above Table (5) furnishes the overall opinion of the respondents on the dimension “safety commitment” of Visakhapatnam Steel Plant. It is observed from the data that an average, 41.59 percent respondents of the sample have agreed with the statements of the said dimension while 22.64 percent respondents have strongly agreed. However, 19.01 percent respondents could not state their opinion and the remaining 16.77 percent respondents are against the said statement. From this analysis it can be conveniently concluded that the safety practices followed by Visakhapatnam Steel Plant is up to the satisfaction of the employees as can be observed from the affirmative response of about 64.23 percent respondents of the total sample.

Table-6 Opinion on the Dimension ‘Safety Compliance’

S.No	Statements on Safety Compliance	SA	A	N	D	SD
1	The safety Committee meetings are conducted effectively in my department.	24.9	38.7	21.2	11.8	3.4
2	All workplace incidents / accidents and near misses in my department / section are reported.	20.2	46.3	23.8	8.1	1.6
3	I am content with the Housekeeping / cleaning in my work area.	20.4	52.6	16.8	6.8	3.4
4	I am comfortable with the work environment (noise, dust, heat and vibration) in my work place.	16.2	38	23	17	5.8
5	I am satisfied with the facilities at our Occupational health and safety research center (OHSRC).	24.9	49.7	15.2	8.9	1.3
6	The permit-to-work / shut down system in my work area is followed earnestly.	32.5	44.8	14.1	6.8	1.8
7	There is a SPOC (specific point of contact) system in my department for raising our safety issues.	19.6	40.6	23	10.5	6.3
8	The safety related issues raised in various audits / inspections in my work area are liquidated with all seriousness.	13.1	42.7	29.8	12.8	1.6
	Average Percentage	21.48	44.18	20.86	10.34	3.15

SA-Strongly Agree, A- Agree, N-Neutral, D - Disagree, SD - Strongly Disagree

Source: Field Study

Analysis: The Table (6) below divulges that an average 44.18 percent respondents of the sample have agreed with the statements of the dimension ‘safety compliance’ as 21.48 percent respondents strongly agreed. While 20.86 percent respondents have not stated their view on the said dimension, 10.34 percent respondents have disagreed with the dimension and the remaining 3.15percent respondents are strongly disagreed with the statements related to the safety compliance. From the foregoing analysis, it may be asserted that safety compliance at Visakhapatnam Steel Plant is prompt, according to the procedure and to the satisfaction of its employees as can be observed from the majority affirmative opinion of 67.66 percent respondents of the total sample.

Table -7 Opinion on the Dimension ‘Safety Awareness / Communication’

S.No	Statements on Safety Awareness / Communication	SA	A	N	D	SD
1	The health and safety policy of my organization is clearly understood by me.	27.2	51	11.5	6.8	3.4
2	If I have a concern about health and safety, I know whom to contact.	22.5	53.7	12	8.4	3.4
3	The Supervisors / Front line officers of my department / section discuss accidents with employees concerned.	15.4	49.7	20.9	10.2	3.7
4	I use the safety committee team to get action on a safety complaint which concerned me.	13.9	46.3	23.8	11.3	4.7
5	All employees in my work area are provided information on type, cause and recommendations of all accidents in our company.	10.2	40.3	27.5	17.5	4.5
6	I have been informed of all the potential hazards and safety precautions to be taken at our work place.	18.6	52.4	15.2	11.3	2.6
7	New training is imparted, based on any accident to the employees of related and similar work area.	9.7	45.3	27.5	14.1	3.4
8	I have been informed about what to do in case of an emergency like fire and gas leakage etc.in my work area.	29.8	48.7	12.8	5.8	2.9
9	All the new employees inducted in our department are properly trained in safety procedures and safe operating practices.	20.4	47.9	20.2	7.3	4.2
10	The visitors are permitted to enter inside our department only after giving necessary safety instructions to be followed.	18.1	34.6	23.8	16.5	7.1
	Average Percentage	18.58	46.99	19.52	10.92	3.99

SA-Strongly Agree, A- Agree, N-Neutral, D - Disagree, SD - Strongly Disagree

Source: Field Study

Analysis: The above Table (7) it is revealed that the overall opinion of the respondents on the dimension ‘Safety Awareness / Communication’ is positive as can be noticed from the majority 69.57 percent positive perception. However, 14.91 percent respondents are negative in their perception while the remaining 19.52 percent respondents were undecided on their stand in relation to the said dimension. It is interesting to note that at Visakhapatnam Steel Plant safety awareness is well and that it is appreciated and welcomed by the employees as is evident from the majority positive feedback from the respondents.

Table 8 Opinion of the Respondents on “Safety Behavior”

S.No	Statements on Safety Behavior	SA	A	N	D	SD
1	In my department, Safety and health issues / hazards identified are corrected in a timely manner.	11	48.4	29.1	9.7	1.8
2	Safety and Health is a high priority when I am performing my job responsibilities.	32.5	47.6	12	6	1.8
3	Rewards for safe behavior are a good way to increase safety awareness levels.	37.4	38.7	15.7	5.2	2.9
4	A safety incentive program would cause employees to work more safely.	39.8	39.8	14.1	3.4	2.9
5	Penalties for safety violations would cause employees to work more safely.	20.4	38.2	20.2	12	9.2
6	I feel that observing both the safe / unsafe behaviors of individuals and giving them feedback will improve the safety levels.	35.3	49.7	8.4	4.5	2.1
	Average Percentage	29.41	43.75	16.59	6.80	3.45

SA-Strongly Agree, A- Agree, N-Neutral, D - Disagree, SD - Strongly Disagree

Source: Field Study

Analysis: Table (8) divulges the overall opinion of the respondents on the dimension “Safety Behavior”. It is evident from the above table that an average, 73.16 percent respondents optimistically responded towards the said dimension, while 16.59 percent respondents did not share their views. However, the remaining 10.25 percent respondents have expressed their dissatisfaction with the said dimension.

Table -9 Opinion of the Respondents on “Stress Recognition”

S.No	Statements on stress Recognition	SA	A	N	D	SD
1	I feel my department is flexible in adjusting work assignments according to employee safety considerations.	16	44.5	26.7	10.5	2.4
2	I trust my Supervisors / Managers to act on safety concerns.	18.1	55.5	17.5	7.3	1.6
3	Sometimes, I work “under crisis / under pressure” when trying to do more work too quickly.	13.1	41.6	25.9	16.2	3.1
4	I am satisfied with my current work assignments.	30.6	46.6	13.6	6	3.1
5	During the past, I had been injured or felt unwell as a result of the Work related	8.9	18.6	15.4	30.9	26.2

	stresses.					
6	I am able to take scheduled rest breaks and still complete my assigned work in time.	23.3	49.2	16.2	8.4	2.9
7	Supervisors / managers are inclined to resolve our personal problems.	13.9	43.5	28.5	10.7	3.4
8	The job expectations or targets are practicable at my workplace.	20.7	60.2	12.3	4.5	2.4
9	As per my knowledge, hurrying has been a factor in an incident / accident or near miss in some cases.	37.7	36.1	16	6.8	3.4
	Average Percentage	20.26	43.98	19.12	11.26	5.39

SA-Strongly Agree, A- Agree, N-Neutral, D - Disagree, SD - Strongly Disagree

Source: Field Study

Analysis: The following Table (9) depicts the overall opinion of the respondents on the dimension “stress Recognition”. From the table it is observed from the analysis that an average, 64.24 percent of the respondents expressed their agreement to the statements of the said dimension, while 19.12 percent respondents have not shared their opinion as the remaining 16.65 percent respondents have pessimistically responded with the statements of the said dimension. It is observed from the data that Visakhapatnam Steel Plant recognizes employees stress. It can further be stated that there exists a healthy co-operation and co-ordination between the Management and its employees.

Table-10 Opinion of the Respondents on “Team work”

S.No	Statements on team work	SA	A	N	D	SD
1	My immediate superior shows interest in the safety and health of the employees in my department / work area.	19.9	56.5	16.2	4.2	3.1
2	My superior often observes my work practices for the purpose of protecting my safety and health.	16.8	45.5	22.5	10.5	4.7
3	If I saw another employee committing an unsafe practice, I would say something directly to him or her.	34.6	48.2	11	3.4	2.9
4	Safe operating procedures (SOP's) for using equipment / machines are discussed with all concerned, reviewed and revised as necessary.	19.6	49.5	18.3	8.1	4.5
5	I have opportunities to provide input into the health and safety program in my organisation.	20.2	53.9	13.9	8.6	3.4
6	I report every workplace injury or illness to my supervisor that I sustain, regardless of its	22	54.2	13.9	7.1	2.9

	severity.					
7	In my department / section, we discuss ways to prevent errors / mistakes from happening again.	29.1	49.5	10.7	7.6	3.1
8	Staff / workers will freely speak up if they see something that may negatively affect health and safety at work.	28.3	47.6	13.4	7.6	3.1
	Average Percentage	23.81	50.61	14.99	7.14	3.46

SA-Strongly Agree, A- Agree, N-Neutral, D - Disagree, SD - Strongly Disagree

Source: Field Study

Analysis: Teamwork is a joint action by a group of people, in which each person subordinates his or her individual interests and opinions to the unity and efficiency of the group. The Table (10) indicates the overall opinion of the respondents on the dimension “Team work” and convey that a healthy average of 74.42 percent respondents have perceived the aspects of the dimension positively while 14.99 percent respondents have remained neutral. However, the remaining 10.6 percent respondents have expressed a negative perception of the present dimension. From the majority assenting opinion of the respondents, it may be concluded that the ambience at Visakhapatnam Steel Plant is conducive to team work as it fosters a sense of unity among the employees.

Table-11 Cadre-wise opinion of the Respondents on the Six Dimensions

Dimension	Cadre	n	Mean	S.D	Z-test	P-value	Decision
Safety Commitment	Executive	164	.8293	.62798	4.813	0.000	Significant
	Non Executive	218	.5098	.65238			
Safety Compliance	Executive	164	.8171	.59464	2.891	0.004	Significant
	Non Executive	218	.6204	.70198			
Safety Awareness / Communication	Executive	164	.7902	.62211	3.462	0.001	Significant
	Non Executive	218	.5495	.70810			
Safety Behavior	Executive	164	.9258	.58766	0.955	0.340	Not Significant
	Non Executive	218	.8609	.70675			
Stress Recognition	Executive	164	.6118	.44179	-0.385	0.7	Not Significant
	Non Executive	218	.6340	.63247			
Team Work	Executive	164	.8918	.57882	1.15	0.251	Not Significant
	Non Executive	218	.8033	.84700			

	Executive						
Overall	Executive	164	.8116	.46889	2.596	0.01	Significant
	Non Executive	218	.6636	.60654			

Source: Field Study

Analysis: The Table (11) below explains the cadre-wise opinion of the respondents on the six dimensions. From the Table (11) it can be found that except the dimension “Stress Recognition” the remaining dimensions have the average opinion score of the executives’ cadre is greater than the Non-executives. Further, the P-values in the Table (11) for the first three dimensions suggests that there is a significant difference in the opinion of the respondents by their cadre i.e., both executives and non-executives opined in a dissimilar way. With regard to the last three dimension the p-values are found to be insignificant(>0.05) which suggests that for these three dimensions both cadres respondents are opined more or less in a similar fashion. Also the average scores are found to be positive and greater than 0.5 which indicates that they are satisfied with the present safety position in Visakhapatnam Steel Plant.

Table-12 Average opinion scores of positions on Safety Commitment

Safety Commitment	N	Mean	S.D	F-Value	P-value	Decision
Below supervisory level	84	.4830	.61531	10.122	0.000	Significant
Front line Management	196	.6516	.65428			
Middle Management	68	.5693	.68378			
Senior Management	34	1.1807	.48004			

Source: Field Study

Analysis: From the Table (12) it is evident that the average opinion scores of all the four positions on the dimension safety commitment has no significant difference. Further, the average opinion score of the respondents belongs to below supervisory position is less than the remaining three positions. The average opinion score of the respondents from senior management is greater than the remaining three positions which concludes that the respondents belongs to this position has more positive opinion on this said dimension when compare with the remaining position.

Table-13 Average opinion scores of positions on Safety Compliance

Safety Compliance	N	Mean	S.D	F-Value	P-value	Decision
Below supervisory level	84	.5149	.72665	8.564	0.000	Significant
Front line Management	196	.7398	.63654			
Middle management	68	.6140	.64311			
Senior Management	34	1.1544	.45857			

Source: Field Study

Analysis: Table (13) indicate that there is a significant difference between the average opinion scores of the respondents as per their respective Position. The Average opinion score of the respondents belonging to senior Management(1.1544) position is greater than that of other three positions, which further thrusts a positive opinion on the dimension ‘Safety compliance’ from this cadre, at 5percent level of significance. Further, it may be observed that the Mean score is above 1.0 implying that opinion of the respondents from this cadre is greater than agree level whereas the remaining three positions opinion score is low when compare to senior management position.

Table-14 Average opinion scores of positions on Safety Awareness

Safety Awareness	N	Mean	S.D	F-Value	P-value	Decision
Below supervisory level	84	.5333	.73326	7.975	0.000	Significant
Front line Management	196	.6429	.67101			
Middle management	68	.5735	.64729			
Senior Management	34	1.1647	.43546			

Source: Field Study

Analysis: From the Table (14) it is observed that perception of the respondents on the aspects of Safety Awareness Visakhapatnam Steel Plant is positive. The respondents belonging to the position of senior management hold a more positive view as compared to other positions. The P-value, which is found to be significant at 0.05 percent level, indicates varying degrees of perception among the respondents of all four positions. However, mean scores of the positions clearly indicate that there is satisfaction among the respondents of all positions in respect of this dimension.

Table-15 Average opinion scores of positions on Safety Behavior

Safety Behavior	N	Mean	S.D	F-Value	P-value	Decision
Below supervisory level	84	.8115	.71219	0.937	0.423	Not Significant
Front line Management	196	.9090	.66801			
Middle management	68	.8603	.64557			
Senior Management	34	1.0196	.45461			

Source: Field Study

Analysis: The Table (15) gives the average opinion score of the respondents from Senior Management is greater than that of the remaining three positions i.e. below supervisory level, Front line Management and Middle management. Further, these average opinion scores are greater than 0.8, implying that the respondents belonging to these positions have an affirmative perception of the aspects of Safety Behavior at Visakhapatnam Steel Plant. Further, the P-value, which is found to be not significant at 0.05 percent level, reveals that the respondents of these three cadres have a similar and positive opinion on the said dimension.

Table-16 Average opinion scores of positions on Stress Recognition

Stress Recognition	n	Mean	S.D	F-Value	P-value	Decision
Below supervisory level	84	.5992	.69806	2.712	0.045	Significant
Front line Management	196	.6786	.52772			
Middle management	68	.4657	.47694			
Senior Management	34	.6928	.43255			

Source: Field Study

Analysis: The P-value (0.045) in the Table (16) exemplifies that there is a significant mean difference between the opinion scores of the respondents by their positions. The average opinion score of the Senior Management (0.6928) is greater than that of the positions of below supervisory level, Front line Management and Senior Management. It can be further observed that the average opinion scores are not greater than 1. It can be illustrated that the respondents belonging to all the four positions are not have that much affirmative opinion of the aspects of stress recognition at Visakhapatnam Steel Plant, inferring that they are not significantly gainfully engaged.

Table-17 Average opinion scores of positions on Teamwork

Teamwork	N	Mean	S.D	F-Value	P-value	Decision
Below supervisory level	84	.7247	.92607	4.526	0.004	Significant
Front line Management	196	.8922	.69564			
Middle management	68	.6728	.67090			
Senior Management	34	1.1728	.49238			

Source: Field Study

Analysis: From Table (17), it is revealed that the Mean scores of the respondents among the four positions chosen for the study are positive. Besides this, the average opinion score of the Senior Management is greater than the remaining three positions followed by Front line Management implying that the perception levels of the respondents of the this positions are much better. The P-value is found to be significant at 0.05 percent level exhibiting a significant average difference in the opinion scores of the respondents of the positions. The positive mean scores of the present dimension clearly indicate that the team work at Visakhapatnam Steel Plant is somewhat conducive and employees are satisfied with the said dimension.

Table-18 Overall Average opinion scores of Positions

Overall	N	Mean	S.D	F-Value	P-value	Decision
Below supervisory level	84	.6117	.63263	6.537	0.000	Significant
Front line Management	196	.7530	.53455			
Middle management	68	.6265	.53571			
Senior Management	34	1.0644	.33702			

Source: Field Study

Analysis: The Table (18) indicate that there is a significant difference between the average opinions scores of the respondents belongs to all the four positions on the factor related to “safety management practices”. It is observed that the opinion score of the Senior Management is greater than that of the remaining three positions, which indicates that the Senior Management are more satisfied with the aspects of safety management practices facilitated by Aegis when compare with the remaining three positions.

FINDINGS

1. The study has witnessed that the average value of safety behavior (0.887) is greater than the remaining dimension followed by team work (0.8413) which divulges that on these

two dimension respondents' opinion is more positive than the remaining dimensions. Then it is followed by the average value of Safety Compliance (.7048), Safety Awareness / Communication (.6529), Safety Commitment (.6470) and Stress Recognition (.6245).

2. The study found that from the overall opinion of the respondents on the dimension safety commitment is high at Visakhapatnam Steel Plant. It can be conveniently concluded that the safety practices followed is up to the satisfaction of the employees as can be observed from the affirmative response of about 64.23 percent respondents of the total sample. As Visakhapatnam Steel Plant is a public sector organisation which gives much importance to safety measures, more than 60 percent of the respondents of the total sample agreed with the statements in the dimension safety commitment at Visakhapatnam Steel Plant that is the vital aspect of safety in any organisation. However, in some areas it is found that whether the Senior Managers seem interested in health and safety before an incident / accident happens, the response is 46.3 percent negative and about 23.6 percent are silent about their answers. Also the neutral answer is more in numbers in case of accidents investigation and follow-up measures, Safety Committee and Safety audits / inspections.
3. From the study, it may be asserted that the overall safety compliance at Visakhapatnam Steel Plant is prompt and to the satisfaction of its employees. But, it is to be noted that here also almost a quarter 21 percent of the responses are neutral that are related to workplace incidents / accidents and near misses reporting (23.8 percent), work environment viz. noise, dust, heat and vibration (23 percent), SPOC i.e. Specific Point Of Contact system (23 percent) and seriousness of liquidation of safety related issues raised in various audits / inspections (29.8 percent).
4. The study has revealed that the overall opinion of 67.57 percent of the respondents on the dimension Safety Awareness / Communication is positive and is interesting to note that the safety awareness of the employees at VSP is well. However, it is worth noting that about 27.5 percent of the responses are neutral in both the cases of information on type, cause and recommendations of accidents to employees and imparting new training based on any accident. Also about 40percent of the responses are to the neutral and negative side as far as the safety instructions to the visitors before they are permitted to enter inside the department.
5. The study exhibited from the opinion of the respondents on the dimension safety behavior that an average of 73.16 percent optimistically responded towards the said dimension. About 30 percent given neutral on timely identification of hazards and correction of Safety and health issues which perhaps indicates that the employees are not interested in revealing

the facts. Also it is to be noted that about 85percent of the respondents opined that observing both the safe / unsafe behavior of individuals and giving them feedback will improve the safety levels in the plant and rewards and incentive for safe performance would cause employees to work more safely.

6. It is observed from the study that VSP recognizes employees' stress. It can further be stated that there exists a healthy co-operation and co-ordination between the management and its employees. It is worth noting that 25.9 percent respondents have not shared their opinion and 55 percent respondents have positively responded with the statement of working under crisis / under pressure. Also 16percent respondents have not shared their opinion and 72 percent respondents have positively responded with the statement of hurrying has been a factor in an incident / accident or near miss. The above indicate that sometimes the momentary stress level is more for the employees while carrying out some jobs.
7. The study reveals that the overall opinion of the respondents on the dimension team work and conveys that a healthy average of 74.42 percent respondents has perceived the aspects of the dimension positively. From the majority assenting opinion of the respondents, it may be concluded that the ambience at the Plant is conducive to team work as it fosters a sense of unity among the employees.
8. It can be found that in the dimensions safety behavior , stress recognition and team work the difference are found to be statistically not significant (i.e. P value>0.05) which suggests that for these three dimensions the respondents of both cadres have opined more or less in a similar fashion in VSP. In the remaining dimensions such as safety commitment, safety compliance and safety awareness / communication, the perception of the respondents belonging to executive cadre is greater than the non-executives; this may be due to the awareness of non executives cadre in these areas are less when compared to executive cadre. So, it may be conveniently concluded that the majority of the respondents attend the safety training for academic purpose only.
9. From the study, it is evident that the average opinion scores of all the four positions on the dimension safety commitment have no significant difference. Further, the average opinion score of the respondents belongs to below supervisory position is less than the remaining three positions. The average opinion score of the respondents from senior management is greater than the remaining three positions which concludes that the respondents belongs to this position has more positive opinion on this said dimension when compare with the remaining position.

10. The study indicates that there is a significant difference between the average opinion scores of the respondents as per their respective position. The average opinion score of the respondents belonging to senior management (1.1544) position is greater than that of other three positions, which further thrusts a positive opinion on the dimension 'safety compliance' from this cadre, at 5 percent level of significance. Further, it may be observed that the mean score is above 1.0 implying that opinion of the respondents from this cadre is greater than agree level whereas the remaining three positions opinion score is low when compare to senior management position.
11. It is observed that the perception of the respondents on the aspects of safety awareness / communication at the plant is positive i.e. the employees are satisfied with the system of awareness / communication and training in the area of safety. The respondents belonging to the position of senior management hold a more positive view as compared to other positions. The P-value, which is found to be significant at 0.05 percent level, indicates varying degrees of perception among the respondents of all four positions. However, mean scores of the positions clearly indicate that there is satisfaction among the respondents of all positions in respect of this dimension.
12. The average opinion score of the respondents from senior management is greater than that of the remaining three positions i.e. below supervisory level, front line management and middle management. Further, these average opinion scores are greater than 0.8, implying that the respondents belonging to these positions have an affirmative perception of the aspects of safety behavior at the Plant. Further, the P-value, which is found to be not significant at 0.05 percent level, reveals that the respondents of these three cadres have a similar and positive opinion on the said dimension.
13. The P-value (0.045) exemplifies that there is a significant mean difference between the opinion scores of the respondents on stress recognition by their positions. The average opinion score of the senior management (0.6928) is greater than that of the positions of below supervisory level, front line management and senior management. It can be further observed that the average opinion scores are not greater than 1. It can be illustrated that the respondents belonging to all the four positions are not have that much affirmative opinion of the aspects of stress recognition at VSP, inferring that they are not significantly gainfully engaged.
14. It is revealed in the study that the mean scores of the respondents among the four positions chosen for the study on team work are positive. Besides this, the average opinion score of the senior management is greater than the remaining three positions

followed by front line management implying that the perception levels of the respondents of the this positions are much better. The P-value is found to be significant at 0.05percent level exhibiting a significant average difference in the opinion scores of the respondents of the positions. The positive mean scores of the present dimension clearly indicate that the team work at VSP is somewhat conducive and employees are satisfied with the said dimension.

15. The study indicate that there is a significant difference between the average opinions scores of the respondents belongs to all the four positions on the factor related to safety management practices. It is observed that the opinion score of the senior management is greater than that of the remaining three positions, which indicates that the senior management are more satisfied with the aspects of safety management practices facilitated by aegis when compared with the remaining three positions.
16. From the study it can be observed that the occurrence of accidents at the plant for has been on the decline. It can be inferred from these details that the management of VSP is very keen on reducing the accidents in the organisation and this expounds the sincerity of the organisation in the effective implementation of safety measures. It is also found from the secondary data in the study that the frequency of accidents has been reducing. However, it may be noted that in the current year it has shot up to very high because of a major accident.
17. The Plant is providing a wide range of personal protective equipments (PPEs) around 35 numbers to the employees working in various departments. It seems that plant is very cautious towards employee's safety. This is also proved in the study that the majority of the respondents are satisfied with the PPEs supplied by the organisation.
18. It may be concluded from the majority opinion of the respondents that the employees of the Plant are aware of the fact that being hurry in work leads to accidents. And this awareness among the employees of the organisation will certainly help in mitigating the accidents. If this tendency in the employees prevails, the organisation will better its goal in the safety aspects very soon. The opinion of all the respondents on this aspect is more or less similar.
19. It may be concluded that the management of Visakhapatnam Steel Plant conducts meetings on safety at regular intervals to ascertain safe working atmosphere to its employees. It can be inferred that the employees at VSP take active participation in the decision making process on safety measures. In VSP there are lots of committees on different safety activities like; shop floor safety committee, central safety committee, incident enquiry committee, safety

inspection committee, internal audit on safety, safety week celebration committee, etc. and most of the employees are involved in one of these safety committees. As such the participation of employees in decision making on safety measures is considerably high.

20. The study reveals that there is a big scope for implementation of BBS system because in each study area there has been a scope for improvement from the present level of these parameters. Further from the accident data analysis still lots of accidents are happening despite the existence of the fully functional safety management system. The human errors being a fundamental cause for accidents the implementation of BBS is the only solution for creating positive behaviors among the workers, staff and managers for effective accident prevention programmes.

SUGGESTIONS

1. Because of the Factories Act and OHSMS, the working conditions are to be maintained as per the prescribed standards. Visakhapatnam steel plant is not exception to this. It is known from the study that the organisation is maintaining the working standards well. In spite of majority respondents had good opinion on present safety standards yet there are few respondents who disagree to it. So it is suggested that the management should improve the present safety standards further to satisfy all the employees in the organisation.
2. The safety culture should be made as an integral component of operation, maintenance, training, purchase and project activities of VSP. The BBS and safety culture programme should be dovetailed with existing safety management system of the industry to make them to be highly effective and successful.
3. VSP should take necessary steps in case of safety awareness to convert the attitude of employees from academic purpose to other practical purposes like life saving, avoidance of property damage etc. and also it to see that all the employees are having the habit of reading safety related reports / statements to take useful decisions in their own area of work which are useful to VSP. The employees should be motivated to read any published statistical data on safety and any lack of availability of concerned books, journals and magazines in the library therefore should be seen by VSP regarding the availability of above books and journals. It is suggested that all the employees of the Plant should acquaint themselves with this aspect and organisation should circulate the accident reporting procedure to all the employees through Employees Information System (EIS).

4. It is suggested that VSP may bring further improvement in good housekeeping at the shop floor in order to reach zero accident level. This can be improved by conducting housekeeping campaigns, housekeeping competitions between departments, regular surprise checks, and training, etc. In this particular aspect the management of Visakhapatnam Steel Plant has to pay much attention towards safety inspections to avoid accidents.
5. It is observed from the opinion of the respondents that VSP conducts enquiries into the accidents at the plant and it indicates the commitment of the organisation towards the safety aspects besides adhering to the procedure laid down by OHSMS. Usually non-reportable accidents are recorded but not investigated by the authorities. Hence, it is suggested that all the non-reportable accidents should be investigated for finding the root causes of the accidents. Elimination of these root causes may help in avoiding the reoccurrences of the accidents in future.
6. In every organisation all the near miss accidents are to be identified and investigated systematically to mitigate the probabilities of major accidents to happen. It may be concluded that steel plant is also taking precautionary and preventive measures to avoid near miss accidents and dangerous occurrences. It is further recommended that the employees should be encouraged to report the near miss accidents and dangerous occurrences without fail and the near miss accidents and dangerous occurrences are also to be investigated thoroughly to find out the probable reasons without hiding the facts. These are very important in safety point of view. If these are neglected, then these near miss accidents may become big mishaps.
7. It can be concluded that the employees working at the site are at the receiving end in most of the accidents that occurred in the organisation. Negligence and over confidence on job, particularly in industrial jobs is very dangerous and it may lead to accident. This is the direct working group who is working in the shop floor and the organisation should see that the employees of this cadre adhere to the safety provisions prescribed to them. Further, it should also pay keen attention in implementing these safety measures without failure and initiate stringent disciplinary action against the defaulters. It is advisable to interact with such employees and if required a refresher training to all these employees on regular basis may be arranged based on the earlier case studies of accidents.
8. The study suggests that VSP has to improve some of its safety measures to avoid the few minor and major accidents; on the other hand, the employees are also supposed to be extra-cautious while on duty. It is a general phenomenon that man is quick-enough to attribute

his faults to his environment or to other people as no one prefers to blame him / her for the mistakes. As the result the employees attribute the accidents to the unsafe conditions. Moreover organisation must ensure safe working conditions to the employees.

9. Providing adequate safety measures at the work place is the prerequisite for any industry and it is benefited to both the organisation and employees. The respondents agreed that VSP authorities are providing adequate safety measures to overcome accidents. It implies that the management of the Plant is good at providing adequate safety measures to ensure the safety of its employees. But some respondents opined negatively with regard to the measures being taken on working conditions such as dust, noise levels etc. in shop floor. It is suggested to take appropriate engineering methods to reduce these noise levels.
10. It is suggested that the copy of the general safety rules that are to be followed should be given to the new entrants of employees at the time of joining and to that of the visitors at the time of issuing the entry gate pass so that they may be aware of the general safety rules and behave at the work site safely. It is also recommended that some short films on connected with VSP safety may be continuously played at some key locations such as the visiting lounges etc.
11. It is well arrived from the study that the BBS systems should be implemented in phases for a continuous period for better results, as seen from the Indian and Global industry practices in BBS implementation.
12. Every employee of the organization should be motivated for BBS system, thus emphasizing the concept with its requirements.
13. International expertise should be drawn in to the organisation for a successful BBS System implementation.
14. The case studies of BBS implementation in other Indian industries should be studied before implementing the same in VSP.
15. The BBS team of VSP should be trained for successful completion of the BBS implementation.
16. Conference room, training facilities, computers and other logistics should be made available for the BBS team.
17. The BBS implementation requires financial budget and adequate dedicated manpower and hence the management should ensure that the above are available for a successful BBS programme.
18. The BBS programme should be implemented in a holistic manner such as to cover all the employees including contract workers.

19. The management should conduct periodical reviews on BBS implementation to ascertain its effectiveness in attaining the set targets and goals.
20. The plant should take necessary steps to create awareness on BBS to all the employees of VSP to overcome the resistance, problems and criticisms about BBS like employees may make irrational demands, it is just wastage of money and other resources etc.

CONCLUSION

Organisations are becoming increasingly aware of the need to provide a workplace that is not only free of common injuries but one that also protects workers, facilities, and the environment from the consequences of more serious incidents involving safety, security, environmental, and other risks. Considering the human sufferings and economical loss due to accidents, it becomes imperative on the part of every one to prevent the accidents by removing or controlling the hazards in industries. Despite advances in accident prevention and providing safe and healthy environment to the industrial workers, safety at work still needs to find a complete solution. Accident prevention does not lie on devising safe machines alone but also on improving the knowledge, skill, attitude, behavior and morale of the industrial workers.

Current safety culture assessment techniques identify general organisational strengths and weaknesses, which are not usually directly linked to specific behaviors. Furthermore, the specific behaviors required to promote a positive safety culture are likely to vary over time and between organisations. It is therefore often necessary for an organisation to further analyse the results of their safety culture measurement processes in order to identify the specific behaviors required to promote or maintain a positive safety culture. The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of an organization's health and safety management.

Behavior-Based safety management focuses on the identification and modification of critical safety behaviors, and emphasizes how such behaviors are linked to workplace injuries and losses. Behavior Based Safety is a process that reduces unsafe behaviors that can lead to incidents occurring in the workplace. The process works by reinforcing safe behavior and identifying the causes of unsafe behavior. The BBS system will help the dilemma of maintaining safety as a priority in peoples' minds when competing with the day-to-day pressures and multiple demands.

The study has revealed that there is a big scope for implementation of BBS system in VSP. The BBS systems should be implemented in phases for a continuous period for better results, involving international expertise thus covering entire workforce including contract workers, as seen from the Indian and Global industry practices.

The BBS implementation requires financial budget and adequate dedicated manpower and hence the management should ensure that the above are available for a successful BBS programme and the BBS programme should be implemented in a holistic manner. The effectiveness of the BBS programme can only be ascertained by ensuring a review mechanism. It is felt that the safety culture should be made as an integral component of operation, maintenance, training, purchase and project activities of VSP, making VSP a trend setter among steel industries in India. The BBS and Safety Culture programme should be dovetailed with existing Safety management system of the industry to make them to be highly effective and successful.

The research suggests that Visakhapatnam Steel Plant should implement the Behavior Based Safety Management system as discussed and arrived in this study, for protection of mankind, the ultimate objective of the existence of the universe.

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