

# Improving Process Safety through BBS-HSE Integration in Chemical Manufacturing

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**Abstract :-** HSE, widely recognised as Health, Safety, and Environment, is a critical function in all industries. The primary responsibility of the HSE department is to manage occupational safety and health, also referred to as Occupational Health and Safety (OHS).

OHS focuses on the health, safety, and welfare of individuals engaged in work or employment. The goals of employee health and safety programs include promoting a safe and healthy work environment. Additionally, OHS aims to protect employees, co-workers, family members, customers, and any other individuals potentially impacted by workplace activities.

In India, the concept of Behaviour-Based Safety (BBS) has emerged as a significant aspect of occupational health and safety management. The chemical manufacturing sector is characterised by high hazards, often leading to serious accidents resulting from unsafe behaviours or unsafe acts. It is recognised that Behaviour-Based Safety can significantly help control such incidents, including minor injury cases.

Improvement in workplace culture directly contributes to a reduction in accident rates. Behaviour-Based Safety essentially involves transforming unsafe acts into safe practices through enhanced awareness and behavioral correction. In the chemical industry, BBS holds paramount importance. This study demonstrates that with the implementation of BBS programs, there is a notable reduction in at-risk behaviors, leading to safer workplaces. The findings confirm that applying Behaviour Based Safety through the HSE function in chemical manufacturing industries is effective and successful.

**Keywords -** Health, Safety, Chemical Industry, Behaviour Based Safety.

## I. Introduction

Chemical Industries are the industry where most hazardous chemical are handled, which resulted into affecting directly or indirectly exposures of employee. Behaviour bases safety can be effectively create a change and result motivates management to implement across the units. Conduct Analysis is dependable examination of behaviour. Associated behaviour examination is events practice and laws originate by fundamental science to issues of living to expand possibility of persons, social actions, relations and governments. Method used to situate these successful practices is justifiable structure.

Behaviour Based Safety concentrates on labourer conduct and human factors as opposed to restricting itself to the customary approach of building shields. The point is to change Behaviour and cultivate a positive, open wellbeing society. This thusly leads to decreased wounds and disease as well as to enhanced confidence, quality, execution and efficiency.

Behaviour based wellbeing is the utilization of behavioural brain research to advance safe

Behaviour in the work environment utilizing representative contribution. It includes at first recognizing honours (practices) basic to diminishing the danger of damage. These practices and practices are then incorporated into an agenda that workers use to gather information on sheltered and hazardous practices inside the association. At long last, representative groups investigate information picked up from perceptions to create activity designs that advance nonstop change in wellbeing.

Today in all Organizations, target of organization is always zero accidents or more disaster free days. All around, headway and creating of all associations are snappy due to prominence of consumables and regular hazards ask for particularly. Advancing workplaces are possessed with growing their business and primary concern era which is focus objective of any gas planning affiliation.

## II.Literature Review

**Kathryn Mearns et al (2003)** shown that a safety culture survey of 13 O&G facilities in the United Kingdom. The investigation on wellbeing and safety correspondence, saw capability for the chief, saw administration responsibility regarding safety, recurrence of general risky practices, recurrence of perilous conduct under motivations, information of safety strategies, work fulfilment, composed guidelines and methodology and ability to report mishaps. Examination of the information uncovered that bosses gave more good scores than most respondents at generally scales.

**Sound et al (2003)** the task of managing threats and organizing safety is as often as possible the movement of system levels with operational (at work) executives to the most negligible level, where accidents occur, being controlled by development and human behaviour (individual or social affairs), which is therefore controlled by the acquisition of benefits, information and courses by the organization.

**Cox et al (2004)** behavioural approaches to managing the well-being of the organization are now a commonplace and should enhance the elevation to ensure safety in the workplace, in relation to the well-being of segregation, as well and risk control.

**Samir et al (2013)** the document states the status of the review of OHSMS work in the organizations of the system. Mechanics / major events are portrayed accidents near the main driver in the past. The OHSMS application with an effective philosophy can end these scenes and incidents, such an approach is in the same way it is considered for the fibre industry whose review case discussed in this article. The initial technique is to perceive the openings between the suggestive requirements and existing business practices and to use an overview of the steps and perspective of the accumulated data suggest. In addition, the basic pilot model for the company in particular is also proposed.

**Rosliza Osman (2015)** enhancing wellbeing execution by applying conduct based safety (BBS) into danger control has been received in real industry. This way to deal with anticipate episode has various points of interest. The point of this paper is to recognize the BBS mindfulness level among specialists in assembling industry. The philosophy of this paper is through quantitative research in view of 53 respondents of enrolled wellbeing and wellbeing officers (SHO).

## III. Research Methodology

Method of get-together tried, true and critical information is cardinal part of enquiry that structures central association in implementation and action for entire exploration plot is basic to make considerable determinations. Present study in considering both dynamic & flexible data. Study included good course of action of status & devising to secure vital overhauled data & information. Remembering objectives of study, going with methodology has been gotten for driving current study. Fundamental examination of diverse Safety Management System parts of chemical manufacturing company was made by discrete examinations, investigation of records & plants evaluation by walk around study to get in contact at truth which told believable conclusions. Discernments were definitely taken for naming weight ages to various trashes of complete prosperity organization structure. Information was assembled from various sources that consolidate records, presentations & relevant chronicles. Data was affirmed at site for their execution. In order to get further details, talks were held with all concerned operators of HSE faction, Safety Committee people from diverse

workplaces & other workplaces' Managers & workers.

### 3.1.1 Primary Data:

Substance of dynamic information is amassed from workers through sorted out Questionnaire went for swap perspectives as part of study. Subjective information was accumulated from sources concentrating on running with six guideline estimations measured in study:

Safety Commitment Safety Compliance

Safety Awareness/Communication Safety Behaviours

Stress Recognition Composed exertion

A particularly formed review was utilized for social event information from target respondents, dealing with & isolating information & landing at conclusions. Respondents binding imperative part of wellspring of crucial information are Executives from Junior Manager (E0 Grade) to General Managers (E8 Grade) & Non-Executives at different levels who are working in specific branches of PIIL.

Master controlled audit to respondents figured in delineation, considering earlier approaches he guided especially & went on review for official structures while for non-official units he was available when every defendant was observing study & saw that respondents addressed separated & did not immediate any one. Respondents were instructed of motivation driving study & they were offered time to answer audit.

### 3.1.2 Secondary Data:

Matter of aide information required for study is acquired from diverse before studies in pertinent field, diaries, magazines, scrutinizing material, unmistakable Safety Reports from intranet way of SED, difficulty bits of learning & examination reports, flourishing overview reports, safety assessment reports, yearly reports, chemical manufacturing plant

### 3.1.3 Sampling:

Space for present study is Private Sector Undertaking organized at Chemical manufacturing company. It is, in light of present circumstances, work extended & persevering workers in this unit. There are diverse frameworks in association like underneath supervisory level, front line troughs, centre association & higher association & so forth.

### 3.1.4 Selection of sample:

Study has considered company employee as well as contractual work man working in chemical manufacturing company. All primary time work environments are chosen for study. Out of aggregate, continuing pros instance of power delegates & Non-Executive fitters are chosen for study. All amount of inhabitants in chemical manufacturing company. Chemical Manufacturing plant is distinctive stratus in context of exercises of period & from every stratum defendants have been singled out stratified taking gander at reason. For underneath supervisory level & supervisory level person utilized precise sporadic testing framework to gather key information through concentrate however for within association & Head of work environments expert utilized crucial subjective looking at strategy.

### 3.1.5 Statistical Tools:

Information was encouraged to PC. approaches & outcomes for examination were finished with Microsoft Excel for Statistical estimations, for graphical evaluation.

In relationship with each one of estimations of safety society at chemical manufacturing unit, genius has related to find refinement in normal feeling score of respondents by position watchful & sort of job.

Following method is utilized to frame the BBS implementation through HSE function.

Steering committee shall be formulated from BBS trained employees. Steering committee shall develop checklists, select

areas of BOFP Shall develop timetable  
Shall implement the timetable

Document, analyse the results and review the progress Allocate time for BBS observations and meetings

**CHECK LIST FOR MONITORING OF AT RISK BEHAVIOUR**

OBSERVER \_\_\_\_\_

DATE \_\_\_\_\_

DEPARTMENT \_\_\_\_\_

TIME \_\_\_\_\_

JOB \_\_\_\_\_



BEHAVIOUR CATEGORIES	SAFE	AT RISK	COMMENTS
<b>PPE</b> Using PPE e.g. eye glasses, hearing protection, gloves, hard hat.....			
<b>Housekeeping</b> Work area maintained appropriately, e.g. trash and scrap picked up, no spills, walkways unobstructed, materials and tools organized....			
<b>Using tools and equipment</b> Using correct tools for the job, using tools properly, and tool in good condition....			
<b>Body positioning/protecting</b> Positioning/protecting body parts, e.g. avoiding line of fire, avoiding pinch points.....			
<b>Materials handling</b> E.g. body mechanics while lifting, pushing and pulling, use of assist devices.....			
<b>Communication</b> Verbal and non-verbal interactions that affects safety...			
<b>Following procedures</b> E.g. obtaining, complying with permits, following SOPs, lockout, tag-out procedures...			
<b>Visual focusing (attentiveness)</b>			
<b>Using mobile while working</b>			



Observed By (Signature):

**Table 3.1 Check List For Monitoring of At Risk Behaviour**

**Seven principles of BBS:**

Thoroughly draw in experts to centrality of behavioural thriving. Set models for all pros at all levels for enthusiasm for safe conduct.

1. Lax little practices lead to level of mishaps & wounds.
2. Focusing on particular practices & making inspiration validated by all specialists for data makes working environment responsibility in safe practices.
3. Arranging masters to lead as safety screens & component acknowledgment & reporting advances specialist engagement & consistence.
4. Genuine survey of past wounds & misfortunes give information driven results to crucial power for change use.
5. Change intercession through cognizant perception by masters with general get-togethers & conceptualizing will

join congruity of safety based conduct.

6. Offer evaluations to delegates on individual practices & flourishing behaviour.

7. Key association commitment is essential to give tutoring & case to specialists to focus on working in space focused on safe conduct.

8. BBS is proactive procedure that gets changes in work get-together's ensured conduct levels before scenes happen. All scenes are gone before by some sort of conduct, e.g. specialist tumbles off phase since he was over-coming to or wandering stool was not secured. Both singular practices. BBS tries to change individual's perspective, inclinations & practices so that these "at danger" practices will never again be performed.

Accusing those with scarcest say; paying little heed to way that supporters of BBS endeavours say they don't "charge experts" this is thing that happens in event that you don't ask "why" some individual did what they did. By asking "why" we can take after chain of occasions & reasons that lead to labourers being acquainted with dangers. When we start to ask in matter of for what reason conduct happened we move back along different chains which never- endingly include association.

All around as colossal lion's offer of misfortunes can be ascribed to risky conduct by cutting edge powers, beast bigger bit of mishaps are in interim inferable from activities or inactions by association.

A representation will make point.

An expert jumping strategy of staircases falls down & is harmed.

#### **Why did he fall?**

He was not using handrail, as he was required to do by connection plan.

#### **Why not?**

He was using the two hands to go on mechanical social affairs.

#### **Why?**

In occasion that he used one hand to hold rail he would have foreseen that would make more than one experience all around every through stair to get his gadgets to bring down level.

#### **Why didn't he isn't that benefit?**

Since there was weight from manager to do what ought to be done quickly. Creation weights routinely lie behind hazardous exercises by specialists thusly.

Disregarding all alliance discuss putting flourishing notwithstanding, background of various workers, not all, is that creation covers safety. Regardless, we can go more far away than this. Shortcoming to use handrail is by all record not by any strategies principle reason expert fell.

He fell in light of way that stairs were absurdly steep, extraordinary arrangement more persuading than would be alluring in headway heading for houses, for occasion.

#### **Why were they so steep?**

Since modellers had not considered dangers of steep stairways. Why had fashioners not considered this risk?

Since they had not got theory of drawing out dangers at source.

#### **Why not?**

Since controller was not executing huge headings. This case could without extraordinary arrangement of extend be passed on further, yet this is sufficient far to demonstrate truly multi-causal nature of every mishap.

Mind claim to fame of Behavioural Safety - Why Focus on Unsafe Behaviour? Regardless of actuality that difficult to control, around 80-95 % of all incidents are affected by risky practices, which keep an eye on interface with other negative parts (named Pathogens) unavoidable in work process structures or present in work environment. Routinely inadvertently displayed by utilization of essential blueprints, every affiliation has what's taking off to its of mishap making pathogens. These pathogens lie slow and are by and large sheltered, until such time as at least two join and



are endorsed by perilous direct to make mishap.

Behaviouralsafety approaches see and focus on particular plans of unsafe practices; people have propensity to be more aware of their capacity to recognize hurt. Along these lines this gives people partition by which they can control their own specific achievement lead and that of their partners.

An inside upon dangerous practices also gives out and out enhanced once- finished of unfaltering achievement execution than setback rates for two reasons: First, mishaps are picking ensuing aftereffect of causal development that is routinely founded by unsafe lead; and second, perilous practices can be measured unquestionably reliably.

Setback rates have inclination to be used as key outcome measure of safety execution on extremely essential level in light of way that they hail that something isn't right inside alliance's prosperity affiliation structure. As aftereffect of way they are figured, they in like manner give fierce benchmark by which affiliations can consider amplexness of their flourishing affiliation systems across finished business winds. Horrifyingly, this has a tendency to achieve affiliation thought and resources being established on progress accurately when incident rates rise fundamentally. Right when brief issues have all stores of being resolved, affiliation thought and resources are needed to other pressing diverse levelled issues until the point that such time as incident rate rises definitely, and so forward.

Thusly, rather than being proactive, overall public who focus just on event rates as measure of safety execution have propensity to be open in their approach to manage direct achievement. Clearly, general focus on ensured safety lead is proactive as it licenses other prospering related issues in hardship causal bind to be seen and managed before event happens. Since 'achievement lead' is unit of estimation, communitarian, principal impulse system including both affiliation and labourers is motivated chance to see key courses of action of guaranteed and hazardous practices and used to make 'SafetyBehaviour Inventories'. These inventories offer inspiration to workforce to suitably screen and watch their partner's driving safety direct, once consistently, in engaging air. Considering essential couple of weeks' consequences of assistant review, workforce set their own 'safety change' targets. Information data is then given on broken inspiration to allow workgroups to screen their progress in making progress change targets.

Affiliations getting handle on this technique are as often as possible compensated by less events, attempted and genuine safety affiliation, better correspondences and more evident relationship in get-together working, all of which can apply valuable outcomes for creation related issues and basic concern purposes of intrigue.

### Why Do People Behave Unsafely?

People routinely bear on hazardously in light of way that they have never been hurt while doing their business riskily: 'I've by and large done occupation in this way being trademark comment. This may well be true blue, yet potential for disaster is never far away as appeared by changed mishap triangles. Heinrich's triangle, for occasion, supports that for each 330 perilous acts, 29 will achieve minor injuries and in fundamental or lost time event. Over extended time go, thusly, nonattendance of any injuries for all inclusive community who are continually unsafe is truly reinforcing extremely rehearses that no doubt will over the long haul lead them to be truly stung. Standard being appeared here is that outcomes of acting dangerously will about

dependably pick future risky lead; on extremely essential level in light of way that fortified direct has inclination to be repeated.

In spite of way that it isn't sporadic to find continuation of unsafe takes shot at being supported by more than one fortify, some will apply more grounded impacts on social solicitations' direct than others. This is particularly case for manages that are soon, certain and positive. Specialists will assume that it's hard to take after certain flourishing rules and frameworks in occasion that they are dependably (certain) reimbursed by snappy (soon) timesaving that consummations extra time (positive) by acting perilously.

In couple of frameworks, good fashioned work process get arranged in like way underpins social solicitations' dangerous direct. Dangerous direct is once in while progress supported by line boss turning apparently obstructed eye,

or viably encouraging labourers to take exchange courses for creation. Shockingly, this has negative effects that are not everything thought about rapidly clear: First, specialists locate that risky direct pays; Second, it manhandle resources as extremely hones that affiliations contribute stunning measure of vitality, money and effort endeavouring to obliterate are strengthened; and third, by rejecting perilous lead, line officials are transmitting conflicting messages that undermines administrator's trust in whole of affiliation's devotion to thriving.

#### IV. Conclusion

HSE Function is turning into a vital capacity for Organizations which are ending up progressively mindful of the need to give a working environment which isn't just free of regular wounds however one that likewise ensures labourers, offices, and the earth from the results of more genuine episodes including wellbeing, safety, natural, and different dangers. Thinking about the human sufferings and sparing misfortune because of mishaps, it winds up noticeably basic with respect to each one to keep the mischances by evacuating or controlling the dangers in businesses. In spite of advances in mishap counteractive action and giving protected and solid condition to the modern specialists, wellbeing at work still needs to locate an entire arrangement which winds up at HSE work.

Mishap aversion does not lie on formulating safe machines alone but rather additionally on enhancing the information, aptitude etc.

Behaviours Based Safety programme implemented through HSE function. The encouraging results observed. It can be concluded that as well as the awareness increases among the workman, the consciousness towards safe behaviour increases.

Observation taken in each on the parameter as indicated in checklist by the BBS champions.

As the HSE function become active and the awareness increases, the at risk behaviours is decrease significantly. The **PPE** related observation was less in starting but as the observation increases the awareness increases as it is the responsibility of champion that he should correct the same at the movement he observe the unsafe act.

The **housekeeping** related behaviours is also shows the trend of improvement in safe behaviours, however the changes in housekeeping is the change of permanent and do not disturb physically frequently hence the observation reduced as the programme progress. However the results are encouraging and maintained the standard or improved over the period.

Month wise '**Using tools and equipment**' related observation and Behaviour found interesting trend of improvement since the activity are depended in the mechanical and project related parts and the activities are non-regular activity hence the observation are up and down, even after the improvement seen and safe behaviours percentage improved w.r.t observations captured

#### Future Scope

Study can further be done for following scopes for the promotion of Safety through Behavioural Based Safety approach:-

1. To Create Awareness among all the employees from Managers to Workerman about the Behaviour aspect of Safety As Per OHSAS 18001:2007.
2. To Create Occupational Safety As A Bottom-Up Approach In Indian Chemical manufacturing Organizations
3. To Create Organisational Safety Culture Across Chemical Manufacturing Unit By Training For Behaviour Safety.
4. To Monitor Behaviour Based Safety Implementation Process For Six Months To Enhance Implementation Process And Also To Monitor Cultural Change In The Organization.

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