Effectiveness of Communication in Human Resource Management

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ABSTRACT

Management is the art of getting things done through human resources. Management is the process of reaching organizational goals by working with and through people and other organizational resources. It requires efficient planning, organization, direction and control over all the essential activities of any organization. Thus, it brings together all Six Ms i.e. Men, Money, Machines, Materials, Methods and Markets. To achieve the objectives of the organization such as high sales, maximum profits, business expansion and so on. Motivation is an art of getting things done willingly from others. It holds the key to productivity in any organization. William Scott defines communication in management as a process which involves the transmission and accurate replication of ideas ensured by feedback for the purpose of eliciting actions which will accomplish organizational goals. Communication plays a pivotal role in information sharing. Effective communication can add vigour to team work thus bringing desired results to the organization as well as to the individuals. The study tries to understand the effectiveness of communication and training at an industrial level and its role in management and motivation thus bringing in a more productive human resource that can progress in all spheres of activity.

Introduction

Modern age communication displayed in Process Plant

Communication methods had a drastic change over the years but still certain old methodologies hold good even now. The pictogram is in use in various styles developed using the computer aided technology to indicate the types of Personal Protective Equipment to be used in an Industrial area. This signage instructs those entering a plant area to have all these protection. This resembles the age old cave painting which was used to communicate among villagers in olden times. The messages given below are the requirements of personal protective equipments required to enter the area. The signage represents Safety shoe – for the protection of foot in the event of accidental fall of objects from the top or hitting of hard materials while walking etc. The toe portion is having steel protection to protect the sensitive toe part. Hand gloves- for the protection of hand from heat or to avoid the spillage of chemicals while doing an activity. Goggles to protect the eyes from any accidental splashing of chemicals or to avoid the heat rays during welding and Ear muff to protect the ears from the noise induced hearing loss in the plant area. Thus the signage

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clearly indicates the requirement of minimum personal protective equipments to enter a process plant.

Fig.2: Safety Signals

Attractive signage is also seen in the plant to make workers understand the availability fire fighting tools available in the vicinity. The place where the fire hose reel is indicated in the first one, the availability of fire extinguisher in the second one and the manual call point to call for help of fire service personnel are available at almost around any industry and this resembles the cave paintings of olden days. The posters are also put in to use to communicate the hazards and to imbibe safety cultures among the work force.

Fig.2: Safety Signals

The earlier methodology of drums to send signals is further modified with fire siren. Different types are sirens are available to indicate gas leak, major fire or an on-site disaster. Assembly points are available in the site area for the workers to assemble and wait for subsequent instructions from the supervisor in the event of an accident at the site. Smoke Signals of olden days is taken care by gas detectors which will sound alarm in case of any gas leak inside the plant. This will enable the workers to move to the safer place. Wind socks are also provided to know the wind direction in the area so that one has to move in the upwind direction in the case of any gas leak.

The Present day Problems

- **Influx of migrant labours**

  The shortage of domestic workers in the home land paved the way for the ingress of migrant workers for semi skilled and unskilled jobs. Migration is due to economic compulsions from one part of the territory of India to another causes dislocation of home life including educational deprivation of children. It has generally been observed that the whole family moves to the new location and often shifts to another location frequently. Upon shifting they are exposed to new stresses and strains on account of change of climate, language, socio-cultural customs and practices. Adjustment to these changes at the new terrain becomes difficult and often painful. These hazards are not unique to any trade but are common to all construction workers in one way or the other.

- **Lack of awareness**

  The awareness of the job knowledge has come down considerably due to language barriers. Efforts are to be made to make them aware of the critical aspects of the job in the language known to them. It is evident from the Bhopal disaster that the Operators engaged are of High School pass outs who find difficult to grab the operating manuals brought out in English.

- **Lack of training**

  The training is enhancement of the knowledge and is essential for adult. A regular refresher is also necessary to keep them upated on the latest information related to plant operation. What happened in Bhopal was the trainings were cut short as a part of austerity measures following the tough competition of pesticides in the Indian market.

- **Bypassing safety systems**

  The process Safety systems are the essential requirement of any Plant and this communicates the system through audible alarms in event in fluctuations in the set variables. Thus the Safety systems play a vital role in the safe operation of the Plant. In fact all most all Safety systems in the Bhopal were not in place/functional for the past few days.

Motivation behind the study

Industrial growth is essential for any country for its progress. Industrial growth also needs massive workforce to complete a project within the scheduled target date. Our country has been a witness to many accidents, both known and unknown to us during the period of the industrialization. The worst recorded one being the well known Bhopal disaster which not only took away many but also rendered those living impaired. Every accident investigation came out with the report labeling the reason for the accident as 'human error'. In fact, there is a claim that 90% of the accidents are due to the same 'human error'. A review of this accident is made with the support of wide literature published on this subject in the exploratory research. The word 'human error' is a vague word and is infinite. This exploratory research on the Bhopal disaster throws light on the exact reason of this accident. The motivation of this study is to underline the finite reason such accidents and to pass on the message that effective communication does have a role in averting disasters. The effective utilization of communication is essential for the safe operation of any Industry.

Objectives

The specific objectives of the present study are as follows:-

- To evaluate the knowledge of emergency preparedness required for a Chemical processing Unit and the strategies adopted by the concerned authorities in the past. This is achieved through a thorough review of the research on the existing strategies.
- To assess the knowledge of emergency preparedness among the industrial employees with regard to migrant workers. Primary data collection followed by use of descriptive statistics and other data analysis methods. The assessment will have special focus on effectiveness of communication. An informal interview was conducted before the start of the training session and the respondents were evaluated. Post-training , the interview was conducted again to look out for improvement.
- To highlight the need for proper policies and technology for meeting emergencies

The Bhopal disaster

Union Carbide, a company that came to colonial India in 1905. In 1969, the huge multinational corporation started a plant in Bhopal, to

manufacture pesticides. By 1983, the company had 14 plants in India manufacturing chemicals, pesticides, batteries and other products. In December 1984, Union Carbide brought permanent darkness to the lives of thousands of residents in Bhopal, maimed and injured several hundred thousands more. The events of that fateful night left a swath of destruction and desolation that has only been rivaled by the nuclear explosions at Hiroshima.

Summary of background and causes

UCC was invited to India by then Government to manufacture pesticides to boost agricultural production in the country. The UCIL factory was built in 1969 to produce the pesticide Sevin (UCC's brand name for carbaryl) using methyl isocyanate (MIC) as an intermediate. A MIC production plant was added in 1979. During the night of December 2–3, 1984, water entered a tank containing 42 tons of MIC. The resulting exothermic reaction increased the temperature inside the tank to over 200 °C (392 °F) and raised the pressure. The tank vented releasing toxic gases into the atmosphere. The gases were blown by northwesterly winds over Bhopal. Bhopal disaster is the worst industrial disaster which took lives of more than 20000 people and still the disaster continues to knock those who survived the disaster.

Researcher undertook an exploratory research to find out the main cause of the accident. Various books published on the Bhopal disaster were reviewed for this purpose. Due to a lack of political willpower, the toxic waste from the disaster has still not been cleaned up. Let us have a look into the various Near misses, incidents and accidents occurred in the Bhopal plant prior to the worst disaster. Near miss incidents are such incidents which had potential to cause injury or damage was just avoided. The details of chemical reactions and the details of chemicals imported and others which are made on site are shown below. The technology used by UCIL was tested on Bhopal citizens. Here again the failure to chose a proven technology and is also a communication failure.

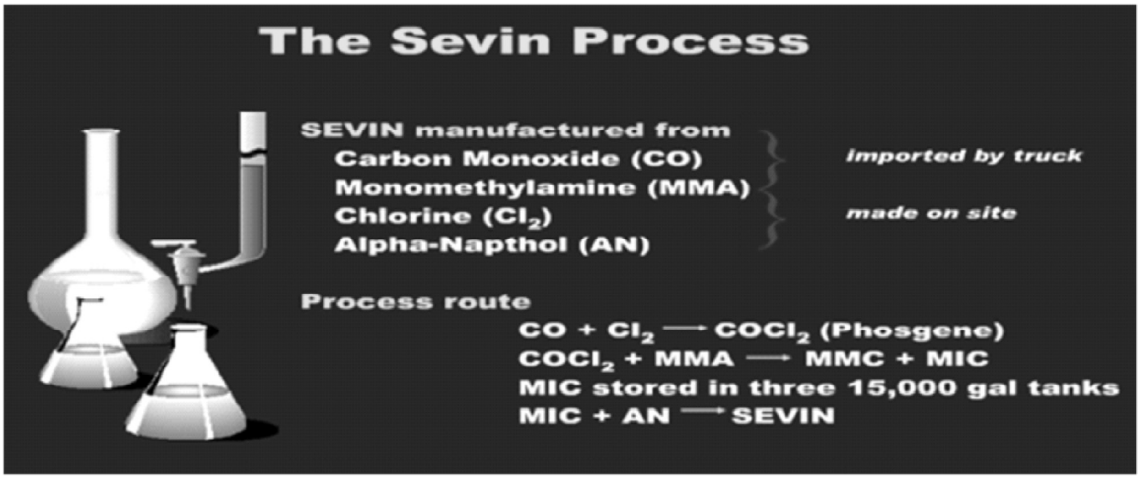

Fig 3 : The process route of the Bhopal Plant

A series of prior warnings and MIC-related accidents had occurred:

1. In 1976, the two trade unions reacted because of pollution within the plant.
2. In 1981, a worker was splashed with phosgene. In panic he ripped off his mask, thus inhaling a large amount of phosgene gas; he died 72 hours later.
3. In January 1982, there was a phosgene leak, when 24 workers were exposed and had to be admitted to hospital. None of the workers had been ordered to wear protective masks.
4. In February 1982, an MIC leak affected 18 workers.
5. In August 1982, a chemical engineer came into contact with liquid MIC, resulting in burns over 30 percent of his body.
6. In September 1982, a Bhopal journalist, Rajkumar Keswani, started writing his prophetic warnings of a disaster in local weekly 'Rapat'. Headlines, one after another ' Save, please save this city', 'Bhopal sitting at the top of a volcano' and 'if you don't understand, you will all be wiped out' were not paid any heed.
7. In October 1982, there was a leak of MIC, methylcarbaryl chloride, chloroform and hydrochloric acid. In attempting to stop the leak, the MIC supervisor suffered intensive chemical burns and two other workers were severely exposed to the gases.
8. During 1983 and 1984, leaks of the following substances regularly took place in the MIC plant: MIC, chlorine, monomethylamine, phosgene, and carbon tetrachloride, sometimes in combination.
9. Reports issued months before the incident by scientists within the Union Carbide Corporation warned of the possibility of an accident almost identical to that which occurred in Bhopal. The reports were ignored and never reached senior staff.

Union Carbide was warned by American experts who visited the plant after 1981 of the potential of a "runaway reaction" in the MIC storage tank; local Indian authorities warned the company of problems on several occasions from 1979 onwards. Again, these warnings were not heeded. Pollution with the plant was reported in 1976 by the trade unions and these went to deaf ears. A communication given was ignored by the management paving the way for a greater disaster.

What is a Near Miss? (prior warnings 1 and 2)

A **near miss** is an unplanned event that did not result in injury, illness, or damage – but had the potential to do so. Only a fortunate break in the chain of events prevented an injury, fatality or damage. A near miss could be a next accident. A near miss is a free learning tool and is to be shared down the line in order to avoid such recurrence, i.e, to be communicated to all operating personnel. But, here, this did not happened and matter was not shared and no action was taken by the management. The unsafe acts and unsafe conditions at the base of the triangle lead to fatal accident. In order to avoid the fatal accidents, one has to identify and remove the unsafe acts and unsafe conditions from the base of the triangle shown below. Every industry has to target for zero unsafe acts and unsafe conditions at work site. UCIL did not respond to the warning bell of the accidents thus ignoring the warning signs many times. The work is neither interrupted or any damage occurs in a near miss.

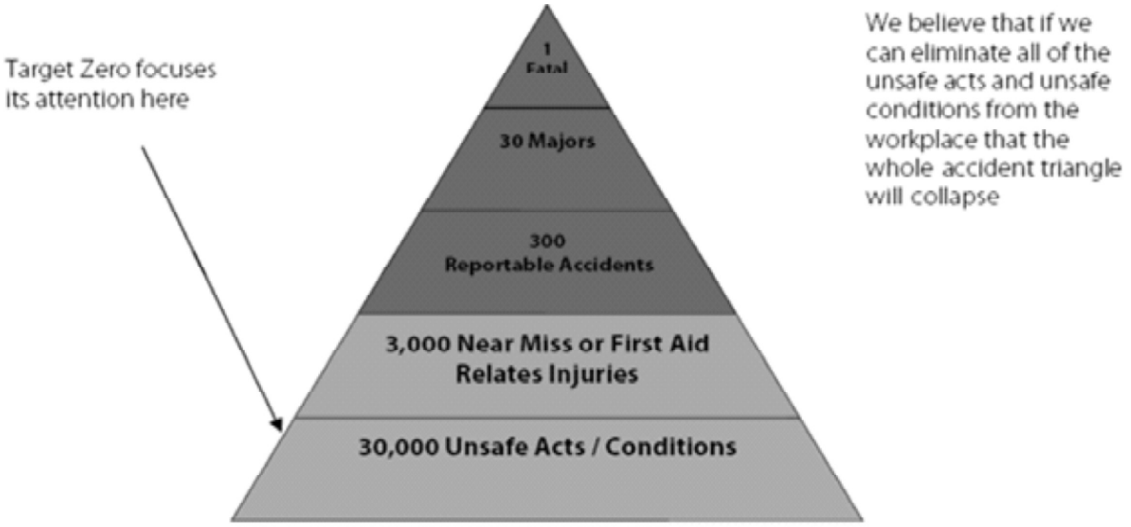

Fig.4 : The Near Miss Triangle

What is an Accident? (Prior warning 3,4,5,7 and 8)

Incident (Near Miss) + Injury = Accident

Accident on the other hand hinders the completion of tasks and may cause damage to equipments or cause injuries to personnel. Accident occurs after many near misses. All the incidents were ignored. The employee pattern also changed widely over the years and the UCIL recruited High School pass-outs as Operators since 1981. The manuals were in English and the Operators being from locals finds difficult to understand the content. This paved the way for the communication failure with the Operators. Operators were more in numbers since the beginning of 1984.

Accidents began in the plant from the time it started. Many accidents were covered up. On December 26, 1981 Mohammed Ashraf, an Operator was killed due to leakage of Phosgene gas while he was working in the Carbon Monoxide plant.

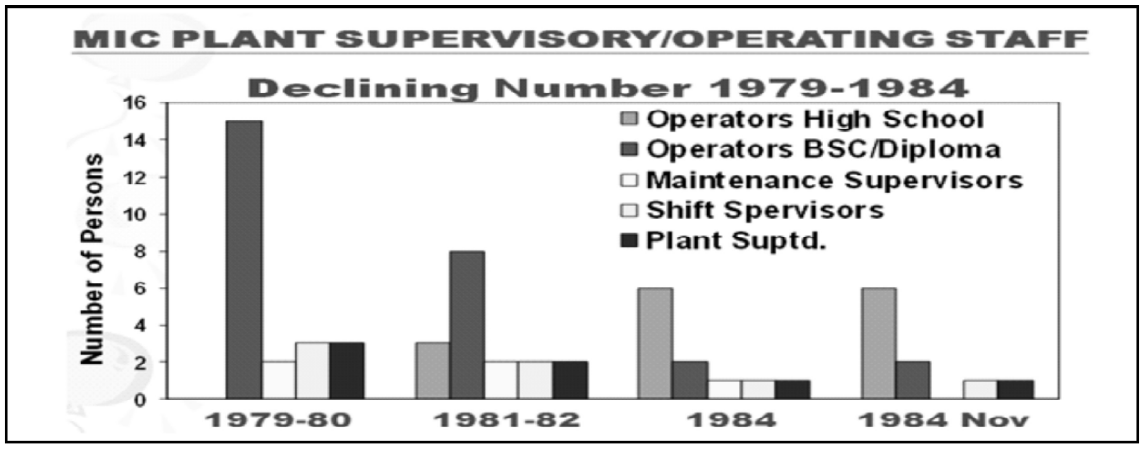

Fig.5 : The Human Resource strength of Bhopal Plant

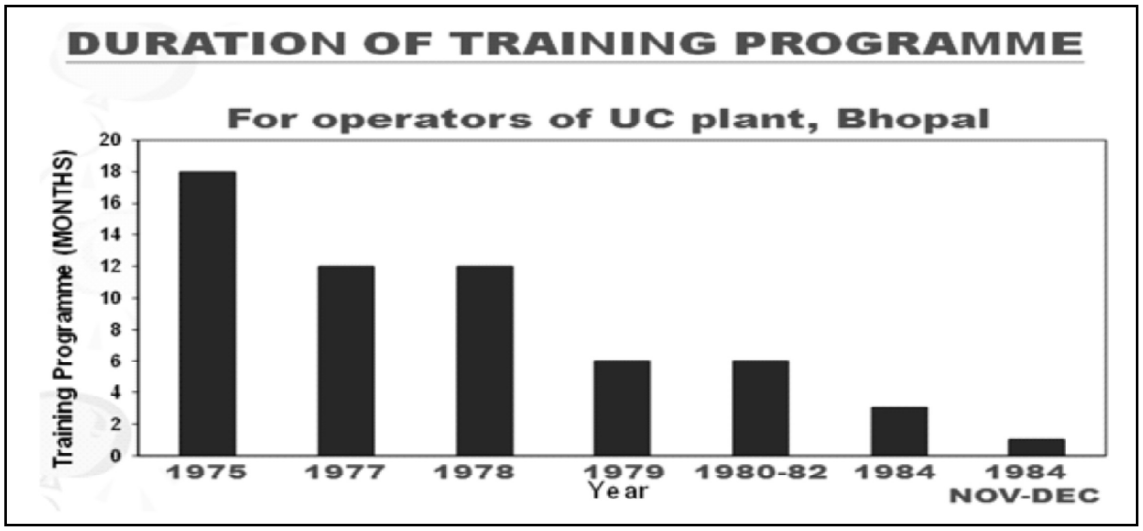

Fig.6 : The Training Calendar of Bhopal operators

The duration of the training was shortened over the period. 'Flippo' has defined training as "the act of increasing the knowledge and skills of an employee for doing a particular job. The term development refers broadly to the nature and direction of change induced in employees through the process of training and education. Training needs are not properly identified and thus employees exposure to training and gain latest information in the plant operation and Process Safety has come down. The information related the employees and the training were shared by an Operator of Union Carbide India Ltd., Mr.Chouhan, who survived the disaster. Case Studies as part of the Mandala Project from American University, have pointed to "serious communication problems and management gaps between Union Carbide and its Indian operation", characterised by "the parent companies [*sic*] hands-off approach to its overseas operation" and "cross-cultural barriers". The personnel management policy led to an exodus of skilled personnel to better and safer jobs. Prior warnings went to deaf ears and either no action was taken to avoid such instances nor the information of such near misses were not utilized for training purposes. The Near miss is a free learning tool which not only helps us to learn from such instances but also help us to avoid recurrence of such accident in future.

Moreover the Personal Protective equipments were not issued to employees due to austerity measures. Safety is given the least priority in the Indian subsidiary company where as high priority was given in the parent organisation. The details of hazardous chemicals are not made known to even those working inside. No public awareness programme was conducted to make them know what to do in the event of any leakage from the toxic gas from the plant. Bayer, another multinational, was also manufacturing the same pesticides using some other technology and does not use MIC for the manufacture of the pesticide. Thus the company is reluctant in utilizing another safer technology which is available in the world may to be due financial benefit. Thus an unproven technology was experimented on the citizens of Bhopal who still struggle. Management failed to communicate the properties of hazardous of the Chemical and the remedial to the employees and general public.


ज्वालामुखी के मुहाने बैठा भोपाल

एक से डेढ़ घण्टे में भोपाल इन्सानी लाशों का ढेर

Fig.7 : The Investigative Report that appeared in Rapat magazine in 1st Oct 1982

The entire Bhopal saga was witnessed from close quarters by Sri. **Rajkumar Keswani**, an outstanding journalist, who had in fact foreseen this catastrophe. His work proves that the tragedy of Bhopal started much before December 3, 1984. Two years before the Union Carbide factory leaked killer gas, he wrote in a weekly magazine called *Rapat* (news): ' *jwalamukhi ki Muhane baitta Bhopal'* (Bhopal on the edge of a volcano)'.published on 1st October 1982 quoting all the near misses and accidents that occurred in the Bhopal factory between 1976 - 1982. Sri. Rajkumar Keswani lost his friend, Sri. Mohammed Ashraf, due to phosgene leak in the plant and that made him to carry out this investigative report. He even informed this to then State and Union Goverment but none did have the patience to hear what he said. Finally it happened on the dreadful night of Dec 2, 1984.

The leak: A worker cleaning out pipes with water sparked the disaster. He did not use a basic but vital piece of equipment (slip blind) to isolate sections of pipe. Water got into the tank where MIC was stored, raising the temperature to over 200 °C, creating the lethal gas. Several safety systems failed or were not working. Operators were not told by the supervisor to add a slip-blind water isolation plate. Because of this, and the bad maintenance, the workers consider it possible for water to have accidentally entered the MIC tank. UCC maintains that a "disgruntled worker" deliberately connected a hose to a pressure gauge.

Standard Operating Procedures are not available to do the job. The Safety audit conducted during the early 1984 identified hazards and many shortcomings and reported the same to the Management but ignored.

Lethal Chemical: The main ingredient of the pesticides made at the plant was a chemical called Methyl Isocyanate (MIC). It is one of the most toxic and lethal substances known to humans. Safe storage requires it to be kept cool and isolated from water, which can trigger a violet runaway reaction creating heat and a deadly gas. The problem in Bhopal was not that the reaction of methyl isocyanate with water created a poisonous gas, but that the reaction allowed methyl isocyanate to escape from its containment. Methyl isocyanate is volatile, irritating to the nose and throat, and toxic. Although it is a liquid at room temperature, methyl isocyanate has a boiling point near human body temperature. At normal room temperature, its vapor pressure is over a third of an atmosphere. It is very clear that the lethal chemical should be stored in refrigerated condition to avoid any vapor release due to atmospheric temperature. The production of gas by the reaction raised the pressure in the container; the generation of heat raised the pressure still further. This rise in pressure caused a rupture of the containment vessel, released the MIC into the surrounding air. The heat also made the methyl isocyanate more volatile.

Chemicals abandoned at the plant continue to leak and pollute the groundwater. Whether the chemicals pose a health hazard is disputed.

Contamination at the site and surrounding area was not caused by the gas leakage. The area around the plant was used as a dumping ground for hazardous chemicals. By 1982 tubewells in the vicinity of the UCC factory had to be abandoned. In 1991 the municipal authorities declared water from over 100 tubewells to be unfit for drinking. UCC's laboratory tests in 1989 revealed that soil and water samples collected from near the factory were toxic to fish. Twenty-one areas inside the plant were reported to be highly polluted. In 1994 it was reported that 21% of the factory premises were seriously contaminated with chemicals. Chemicals that have been linked to various forms of cancer were also discovered, as well as trichloroethene, known to impair foetal development, at 50 times above safety limits specified by the United States Environmental Protection Agency (EPA). A sample of drinking water from a well near the site had levels of contamination 500 times higher than the maximum limits recommended by the World Health Organization.In 2009, a day before the 25th anniversary of the disaster, Centre for Science and Environment (CSE), a Delhi based pollution monitoring lab, released latest tests from a study showing that groundwater in areas even three km from the factory up to 38.6 times more pesticides than Indian standards.

Factors leading to the magnitude of the gas leak include:

- Storing MIC in large tanks and filling beyond recommended levels
- Poor maintenance after the plant ceased MIC production at the end of 1984
- Failure of several safety systems (due to poor maintenance)
- Safety systems being switched off to save money—including the MIC tank refrigeration system which could have mitigated the disaster severity

The gas cloud was composed mainly of materials denser than the surrounding air, stayed close to the ground and spread outwards through the surrounding community. The gas being denser, accumulated at lower area such as culvert, pit and drains. The initial effects of exposure were coughing, vomiting, severe eye irritation and a feeling of suffocation. People awakened by these symptoms fled away from the plant. Those who ran inhaled more than those who had a vehicle to ride. Owing to their height, children and other people of shorter stature inhaled higher concentrations. Many people were trampled trying to escape. There was also a confusion on the gas leaked. First it was informed that the symptoms are of Cyanide gas leak and the country do not have any antidote for cyanide was immediately ordered. The non-toxic antidote sodium thiosulfate ($Na_2S_2O_3$) in intravenous injections increases the rate of conversion from cyanide to non-toxic thiocyanate. Treatment was suggested early, but because of confusion within the medical establishments, it was not used on larger scale until June 1985.

Study and its Interpretations

Employees of the selected Public Sector Undertaking were focused and training was given to around 939 regular employees. Various safety aspects were covered in the training. These employees insist the site supervisors to conduct daily safety talks at work site which improved the safety culture in the worksite. A questionnaire survey was done prior and after imparting training. The Safe work culture has improved a lot after the training. A wide change is noticed after the training pertaining to safe working culture. The

study revealed that the Bhopal disaster was purely due to lack of communication and training. The disaster would have been avoided if employees were given training on the use of hazardous chemicals and on emergency preparedness. This study emphasizes a foundation stone for the regular training for employees through short term animated or video films which the researcher utilized in his training. The organisation improved the below mentioned area after the training:

- Reporting of Near miss at work site
- Usage of Personal Protective Equipments while at work
- Incident rate at work site
- Hygienic Conditions at the work site
- Participation of workers in the tool box meeting

The majority of the participants are of the view that lack of communication and training as the main reason of the Bhopal disaster.

95% of the participants agreed that the Lack of communication and 98% of the participants agreed to the lack of training as the reason to the worst disaster. The avoidance of prior warnings are also included in the lack of communication. After Bhopal Gas Tragedy of Union Carbide India Ltd., Govt. of India enacted and amended some laws to prevent and mange the Chemical (industrial) Disaster.

The important laws are:

- Manufacture, Storage and Import of Hazardous Chemical (MS and IHC) Rules, 1989;
- Factories Act 1948 and subsequent amendments;
- Central Motor Vehicles Rules (CMVR) 1989 and amendments;
- Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996;
- Public Liability Insurance (PLI) ACT, 1991; and
- Disaster Management (DM) Act 2005.

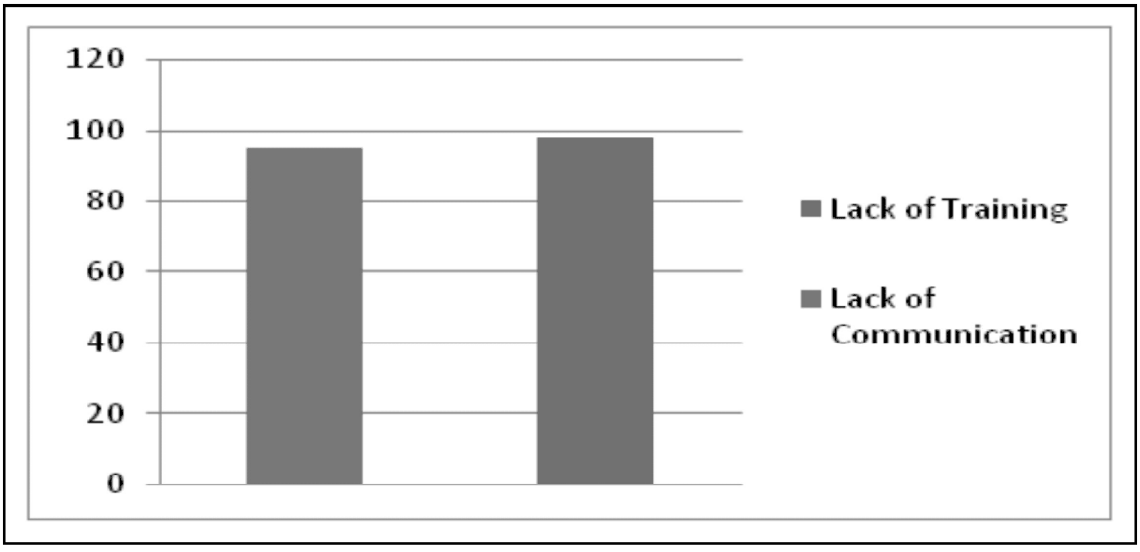

Fig-8 : The result of sample survey: Views of those supported that Lack of training and Lack of Communication caused the Bhopal disaster

The city of Cochin in the Ernakulam district of Kerala with a total population of over 6,00,000 has the business capital of the state of Kerala which is known for its high literacy rate is chosen for the study. Ernakulam district has the most number of industrial installations in the State categorized as major accident hazard (MAH) dealing with hazardous chemicals.An United Nations assisted project has found Ernakulam among the six high risk industrial areas in the Country.

Rank	Industrial Clusters	State
1	Manali-Ennore	Tamil Nadu
2	Thane-Belapur	Maharashtra
3	Cochin	Kerala
4	Kanpur	Uttar Pradesh
5	Haldia	West Bengal
6	Vadodara	Gujarat

Table 1: High Risk Industrial Areas as taken from reference

Recommendations of the Study

It is evident from the analysis that proper communication and training could have averted the worst disaster. All the safety systems are not working. UCI is not prepared for such an emergency. There was a wide confusion on what was the substance leaked out and that delayed the treatment initially. No handout documents are available giving the hazardous properties of the chemical are available at the factory.

Conclusion

Whatever the nature of the industry, communications plays a vital role. Proper training to employees is a must thus updating their technical information. Mere availability of safety systems is of no use. Safety systems available are to be checked at periodic intervals. Public awareness programme is to be conducted and make the villagers aware of the potential danger of the chemicals. All chemicals used in Bhopal are hazardous. Selection of right technology requires good knowledge in the subject.

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