Comparison & Determination of Safety Environment for Small Scale Industries using Various Parameters – An Industrial Engineering Approach to Save Resources.

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Abstract- Industrial Engineers always think about the safety of employees in their organizations. Industrial safety is an important issue for organizational development because it has implications for cost, delivery, quality and also for social responsibility. In an industry, number of small accidents can affect the production but a serious accident can affect the entire organization. With relevance of above subject, many questions or consequences will arise about the causes of accidents at workplace due to various reasons. So, many cases show the popular cause of an accident is an unsafe act by an employee in their organization. But on the basis of this study, we can conclude or suggest a perspective reason of an accident is an influence of operating system, organizational environment & social systems. A study highlights here to access unsafe conditions in an Indian small organization to survey about social, technical, and personal factors related to safe work behaviors. Based on the above conditional reasons, we can conclude with prescriptions about safety behavior & solutions to unsafe conditions.

Keywords *:Workplace safety; Industrial accidents; unsafe work practices; Safety hazards; Safety Behavior; Accident diagnosis, Person's (Employee) Responsibility.*

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I. INTRODUCTION

The small scale production industries in India play an important role as a vendor for large scale production units. But in concern of safety measures we can see that many unsafe conditional environments to be placed for such organizations. On the basis of visits to number of small scale organization we put some assumptions & compare the various parameters for the improvement of safety in Indian small organizations. As compare to a well established large scale organizations, small scale industries shows more accidental happenings over the year due to many reasons. In such context many authors found the causes & some remedial actions for safe working conditions. The paper has a purpose or aim to lower the accidental expenditure of organization, improve the safety & increase the production rate. Thus an approach of an industrial engineer can complete its motive by saving the resources.

II. LITERATURE REVIEW

According to Karen A. Brown[1], P. Geoffrey Willis b[2], Gregory E. Prussia[3] [1], Department of Management, Albers School of Business and Economics, Seattle University, USA, workplace safety cannot be packaged neatly into an isolated domain within an organization, and that the operations function plays an important role in preventing costly accidents. Safety hazards and production pressures, in particular, fall into the domain of operations managers and appear to influence employee's decisions about safe work practices.

The study carried out by Mr. Hassan Darvish[1], Mehdi Roostaei[2], Saeed Azizi[3], [2] Payame Noor University, Tehran observed that employees and management believe in safety as the first priority in the organization and they value award of regulations relevant to their occupation. Also, employee supposes to cab the effective on health and safety issues. They have been encouraged to observe safety issues and have sense of responsibility to observe safety instructions.

The Code of practice by ILO (International Labour Organization) [3] on safety and health in the iron and steel industry shows the various provisions for safety of workers & defines the entities to empower the systematic organizational structure.

Professor & Head, Prof. Martand Telsang [8], KESRIT, Sakhrale, Sangali (MH, India) in his book Industrial Engineering & production Management explains ergonomically as well as Industrial organization concept for the safety of workers for Indian technical development. Author says agronomical safety & work study concepts can improve the production rate & lower the accidental expenditure of an organization.

III. PERSPECTIVE OF WORKPLACE SAFETY.

Industrial organization & research on workplace safety shows its fields such as occupational medicine, industrial hygiene, human factors engineering, safety engineering, labor law, organizational behavior, and human resource management.

An interdisciplinary literature search on safety describes causal variables ranging from the social to the technical and from the person to the system, painting pictures that tended to be incomplete.

IV. SYSTEM & EMPLOYEE RELATION FOR UNSAFE ACT.

As we discuss to find it reasonable to group the explanations for unsafe acts, accidents, and related outcomes of small organizations, can categorize it into three general themes: causes involving the individual person, causes involving the system where the employee work and causes involving system-person sequential interrelationships among the employees. We explain each of them as;

A. causes involving the individual person;

Person (employee) working in Small scale industries in Indian production system have number of causes that show non-behavior able acts resulting in accidents. The reasons due to which person is being a cause due to;

1. Unknown about technical skills. (Illiteracy about work. So, much organization hiring uneducated employee to complete their work with less salary.)
2. Fatigue due to improper salary payments, overtime work, unhealthy conditions of environment provided to them, which results in accident.
3. Employee attitudes and behavior are the most important antecedents to unsafe acts, accidents, injuries (non-cooperativeness)
4. Drunk while working. (Alcoholic)
5. Poverty & unsafe conditions for family fillings in their life.

These are the reasons of the individual person or employee, which base on the assumption that first line employees play the primary role in accidents.

B. causes involving the system where the employee work;

Most of the small scale industries supply vendor product or chemical factories or any product which requires less machinery work for the production. Most of them are run on the seasonable production basis or the requirement of the production in the market. As organization/industry is having such conditional production requirement to the market, so, many of the industry is not having well established infrastructure. Some companies work on contractual basis. So, the organization is not connected with labors or employees working for their production. On the basis of above all reasons following are the cause of accidents;

1. Improper layout. (Design of layout is inadequate to the requirement of standardization.)
2. Material handling equipments are not provided for heavy work as per the requirement.
3. Improper ventilation, electrification & machineries use in the industry.
4. Safety measures like fire-fighting, safety inspectors & maintenance systems are not provided.
5. Unusable machineries, equipments & tools are used for the production.

C. Causes involving system–person sequential interrelationships among the organization.

In every organization relation of employee & governing body (organization) reflects or define the quantity & quality of production. As the organization fulfils all the needs of an employee it will defines the best solution which will erase any problem for an organization. But the condition in the Indian small industrialization is too opposite. We can find out following causes of accidents which are responsible because of both employee & organization;

1. Working hours scheduled by an organization are not suitable for the person. (Most of companies produce the production as they need, without care of an employee health as per organization requirements) These cause fatigue in them & accidents may happen due to restlessness.
2. Salary, wages & incentives are unknown words for the workers/employees. Most of the Industry pays as a working hour basis, like work & earn. Employees think that if they produce more with less time, it results in accidental case.
3. Unfavorable condition in working environment may results in number of small & heavy injurious accidents which affects the employee health & raise the expenditure of organization.

These are the only some of the uncalculated reasons which we found to be as a cause of an accidental cases ever find out in any small organization. In so many cases the above three interrelated themes are responsible for any hazardous action happen in any production unit.

We will discuss about the various parameters that often find as a cause of an accident & then remedial solutions can be hypothetically concluded. All the parameters are related to the person & organization for which we are comparing the safety measures.

V. PARAMETERS FOR SAFETY IMPROVEMENT IN WORKING ENVIRONMENT.

To examine workers' behavior while of performing their occupational tasks, following parameters of safety behavior consideration was utilized. Organizational parameters which also having the same weight age to be considered. The parameters can be categorized as;

A. Person's responsibility towards organization.

Following are various parameters that are responsible for shut down of production unit due to unsafe behavior of person in an organization.

1. Safe behavior
2. Cooperation
3. Communication
4. Safety Priority
5. Participation
6. Individual Priority
7. Individual Perception of risk

A. Organizational behavior towards their employee

Responsibility of an organization towards their employee for the safety is more as it involves large expenditure. Following parameters are to be discussed;

1. Commitment of management
2. Safety regulations
3. Supportive environment
4. Working environment
5. Common value

6. Management of change
7. Style of management
8. Competence & training
9. Incident & accidents
10. Achievement of safety system

On the basis of above parameters, if we evaluate the responsibilities with priority number by inspecting the industry, we can categorize the organization. This categorization ranks the industry & we can know the seriousness of an organization towards the safety environment.

VI. RANKING OF SAFETY ENVIRONMENT OF AN ORGANIZATION GRAPHICALLY.

Graphical representation of safety parameters in any industry can show the safety environment priority for that organization. From such illustrations various accreditation can be awarded to the organization. On X- axis plot the various parameters & on Y-axis rank the above parameters that can be shown graphically with bar chart.

Example; if a company name ABC, MIDC, Wardha has following no. of Ranking/grades in particular parameters, and then we can represent it graphically as below;

Sr. No.	Safety Parameter	Ranking
1.	Safe behavior	5
2.	Cooperation	3
3.	Communication	2
4.	Safety Priority	7
5.	Participation	8
6.	Individual Priority	1
7.	Individual Perception of risk	7

Table 1. Persons Safety Priority towards Parameters

Fig.1. Graphical representation of person's priority towards safety Behavior.

VII. RADAR DIAGRAM FOR REPRESENTATION OF SAFETY ENVIRONMENT IN AN ORGANIZATION.

To examine workers' behavior & organizational behavior towards safety in form of radar diagram can be represented. To represent the persons behavior while of performing their occupational tasks, checklists of safety behavior consideration was utilized. After summing up between 0-10, the data from above method (questionnaire, interviews, observation) will importantly be considered in different domains. It will form 17 radii in a uni-focus circulation, each of them have marked between 0-10. With determining the scores from the industry in each domain and marking it on the axis and then linking the points of all axes, the chart is finally obtained and indicates safety climate profile or safety conditions in the industry.

The analysis like questionnaire to the Employee, Physical observations & interviews can mathematically evaluate the parameters.

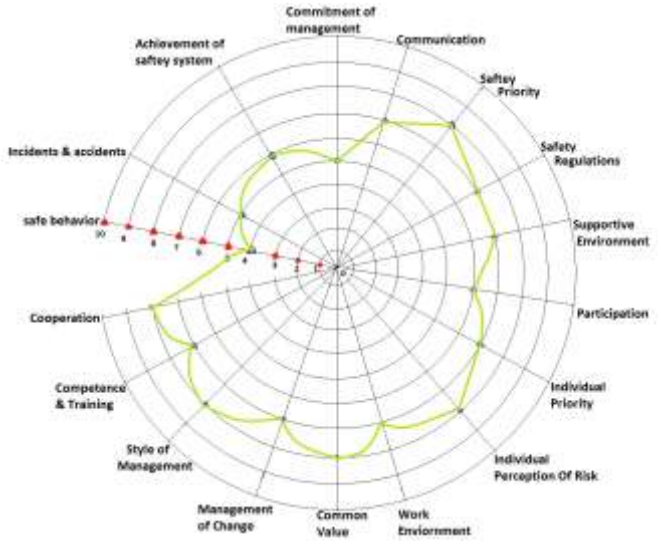

Fig.2. Radar Diagram for Safety Environment in an Organization

The above figure can determine the condition of safety environment in any industry. We observe some conditions from known Industry & tried to put out such figures in the form of represent able Radar Diagram. This is the easiest model or diagram to demonstrate healthy environment about safety in any organization. Here, the various shapes of graph can conclude the safety Environmental conditions.

VIII. CONCLUSION

As a matter of working in the industry, safety is the very important factor during working of the employees. The paper focuses various parameters to be characterized & discuss on the basis of responsibilities of the employees, organization. If safety factor in an organization has to be considered as an important priority function as a production for the small scale industries; it will be more beneficial for the better survival. Determination of a safety environment can be done; using simple graphical calculations & radar diagrams which conclude the safety environment of an organization. Also the industries need not to invest more expenditure on accidental issues & safety is an important parameter with fewer investments for an organization.

REFERENCES

[1] Karen A. Brown[1], P. Geoffrey Willis b[2] & Gregory E. Prussia[3], "Predicting Safe Employee Behavior in Steel Industry- Development and Test of a Socio Technical Model", Seattle University, USA, Journal of Operations Management. 445–465, Elsevier Publication, 10 January 2000.

[2] Mr. Hassan Darvish[1], Mehdi Roostaei[2]& Saeed Azizi[3], Payame Noor University, Tehran "Studying Of Safety Climate Assessment: A Case Study at Steel Industry." Journal of Management &Marketing, Page No. 331-340, volume IX, issue 2/2011.

[3] ILO (International Labour Organization), Sectoral Activities Programme, "Code of practice on safety and Health in the iron and steel industry", MEISI/2005/8.

[4] Dr. Chandra Pinnagoda, Chief, Occupational "Safety and Health Branch Working Conditions and Environment Department" 2001.

[5] "Integrated Environment, Safety, & Health Management Plan", Integrated Safety Management (ISM) System, Lawrence Berkeley National Laboratory Integrated Safety Management System Description, PUB-3140 Revision 8, July 2013.

[6] "The organization of first aid in the workplace Occupational Safety and Health Series", No. 63, ISBN 92-2-106440-9, Second impression 1999.

[7] A book of "Industrial Engineering & production Management", By Prof. Martand Telsang, Professor & Head ,KESRIT, Sakhrale, Sangali (MH, India)

[8] Bentler, P.M., "EQS Structural Equation Program Manual", Multivariate Software, Encina, CA, Jan 1995.

[9] Bigos, Battie, M.C., Spengler, D.M., Fisher, L.D., Nachemson, A.L., Zeh J, "A Longitudinal Prospective Study of Industrial Back Injury Reporting", pp:21–34, January 1992.

[10] Bollen, K.A., "Structural Equations with Latent Variables", Wiley, New York, 1989.

[11] Brown, K.A., "Explaining group poor performance: an attribution analysis", Academy of Management Review 9 _1.54–63, Feb 1984.

[12] A. I. Glendon, D. K. Litherland, "Safety climate factors, group differences and safety behaviour in road construction", Safety science, volume 39, pages157-188, April 2001.

[13] Amparo Oliver, Jozef Manuel Tomas and Alistair Cheyne, "Safety climate: It's nature and predictive power", Psychology in Spain, Vol. 10, No 1, pp:28-36, January 2006.

[14] Ferraro, Lidia (2002), "Measuring safety climate: the implications for safety performance", Department of Psychology, University of Melbourne.

[15] "Health and safety Executive, Summary guide to safety climate tools", Offshore Technology Report, April 1999.