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Behavioural Based Safety Culture in the Construction Industry

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Abstract - Safety plays vital role in the construction sector. This project discuss about behavior based safety culture in a construction site. Safety Culture is the enduring value and priority placed on workers and public safety by everyone in every group at every level of an organization. The objective of this project is to review the case study of fatal and non-fatal accidents to examine the current culture in the workplace regards to the management of safety and health and create a safe working environment for the construction company. A questionnaire is prepared for worker, and circulated to the construction firms. Based on many criteria such as accidents, safety in emergency period, safety information, workplace hazards, and workplace risks, workplace health & safety, welfare and time regulations and finally about review the questionnaire is prepared. The purpose of data collection is to obtain information to keep on record, to make decisions about important issues, or to pass information on to others. The results for the analysis are graphically represented in bar charts for various criteria classified in questionnaire.

Key words: Safety, Safety Culture, Health and Safety Hazards, Questionnaire

I BACKGROUND

Construction Industry is an unorganized sector and it is the least researched industries even today. The system of reporting data about internal working and safety is also minimal. The manpower driven industry is facing regular accidents in daily working, which cause heavy losses in terms of men, money and time. The past studies show that on an average, 60 to 80 accidents occur per 1000 workers in the manufacturing sector while, construction sector

averages around 160 to 250 per 1000 workers. In spite of all the extensive studies and efforts of various organizations working for the cause, nothing concrete has been established for the same.

Throughout the world, the construction area of civil engineering is one of the most hazardous industries. The major causes of accidents are related to the unique nature of the industry, human behavior, difficult work site conditions and poor safety management which results in unsafe work methods, equipments and procedures. Preventing occupational illness and injuries should be a primary concern of all employers. Especially in developing country like India, there must be an effort to raise the level of awareness among both the employers and employees of the importance of health and safety at work sites.

In the construction industry, the working environment is constantly changing, sites exist for relatively short time and the activities and inherent risks change daily. Within a short time of a hazard being identified and dealt with, typically the work scene has changed, bringing new hazards. There is also a high turnover in the workforce, which means safety awareness is not always as good as it should be.

It is a general observation that the large scale infrastructure projects command good safety checks and procedures due to statutory requirements of the tender contracts. But construction in everyday life comprises of large number of small scale projects which are local contractors undertakings lacking in compliance of safety requirements and labour laws. It is the high time that the awareness regarding the present scenario of safety and labour conditions should spread adequately.



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II SCOPE AND OBJECTIVES

The main objective is to examine the current culture in the workplace regards to the management of safety and health and create a safe working environment for the construction company. This goal is realized through the following

A questionnaire is prepared for worker.

Questionnaire is circulated to the construction firms.

Statistics analysis graphically represented in charts.

Based on the statistics results suggestions are provided

III NEED FOR THE STUDY

Safety in construction is a very complex phenomenon, which is not amenable to explanations, much less to control. So this study is necessary for the following reasons:

In construction, there are no licensing conditions or other regulations. Moreover, small capital is required to control.

Entry into the industry is easy.

Acquisition of work is by competitive tendering.

Construction work is done under natural and hazardous conditions.

The scope of the study was restricted to R.C.C. high rise buildings which fall under the residential and commercial category/ type. The construction cost of the building is not considered as the decisive factor for this study

IV RESEARCH METHODOLOGY

The methodology for achieving the above objectives is as follows,



FIGURE 1 METHODOLOGY FLOWCHART



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V CASE STUDY

A. Case Study Analysis

A case study analysis was carried out for both fatal and non-fatal accidents in the construction site and the direct cause, indirect cause was identified, human error was recognized for each case studies and recommendations were given to change behavior of the employees

From the case study, it is clearly shown from human errors that most of the accidents have taken place due to the improper behaviour of the workers and due to the unsafe act of the person.

Unsafe act causes 90% of all the incident and unsafe condition cause 10% of the entire incident.

Case Study:1 Work Description

i. Loading of lorry with metal bins of loads

2 workers were loading metal bins onto the lorry for transportation .One of the worker was standing on the lorry to cover the loaded metal bins with plastic canvas. The other worker was operating a forklift to load the metal bin onto the lorry.

ii. As one worker was manning the plastic canvas for the 1 bin, and the 2 bin was loaded onto the lorry by the forklift Driver The right index finger of the worker on the lorry was caught between the 1st and 2nd metal bins and was crushed. The worker's right distal index finger was later amputated

1. Observation And Findings

The forklift operator had 13 years of experience in driving forklift trucks and had successfully completed the forklift driver's training

The injured had been operating the loading process for about 4 – 5 years.

Investigation reveals a lack of communication between the lorry driver and the forklift driver while loading the metal bins

2. Corrective Measures

Ensure all loading and unloaded operation were communicated and coordinated properly

Brief all forklift drivers and lorry drivers to be vigilant and focus when carrying out loading and unloading operations

To look into an alternative method of covering the metal bins using plastic canvas

Eg. To use covered lorries and canvas “curtains” to cover all metal bins after all had been loaded



FIGURE 2 LOADING OF METALS BINS

From the case study, it is clearly shown that due to the human errors most of the accidents have taken place that is improper behaviours of the workers and unsafe act of the person. Therefore unsafe act causes 90% of all accidents and unsafe conditions causes 10% of entire accidents



FIGURE 3 FATALITY RESULT



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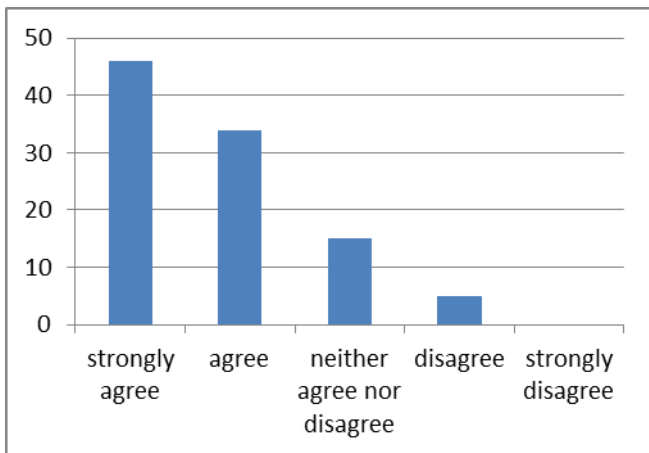
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VI QUESTIONNAIRE SURVEY ANALYSIS FOR WORKERS

1. I feel that it is easy to work with the help of Personal Protective Equipment

- a. Strongly agree
- b. Agree
- c. Neither agree nor disagree
- d. Disagree
- e. Strongly disagree



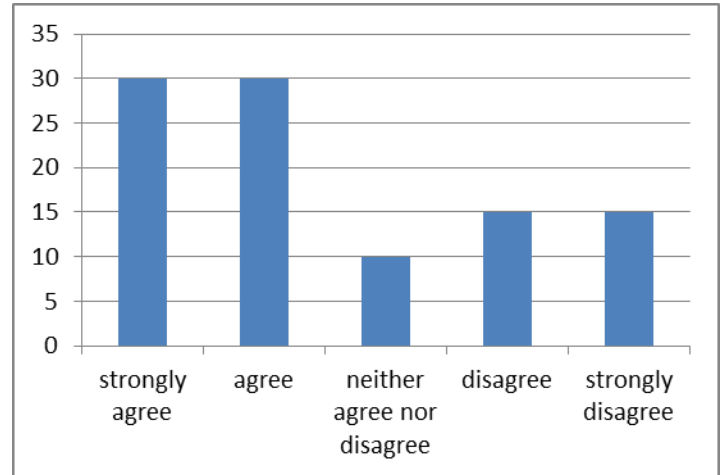
Comments: Most of the people are expressing their comfortableness in wearing the Personal protective equipment.

This denotes the personal protective equipment's which are issued specific to the job nature to the people are fit enough in the way of design.

Company need to focus on people whoever disagree on easiness and individual counselling can be done to improve their behaviour.

2. Safety is not compromised due to deadline.

- a. Strongly agree
- b. Agree
- c. Neither agree nor disagree
- d. Disagree
- e. Strongly disagree

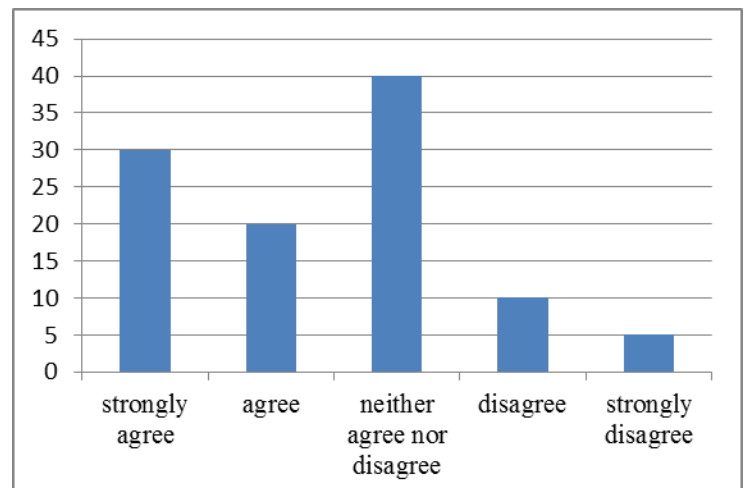


Comments:

Most of the individuals are stating that safety is not compromised due to the deadline. Signifies that safety is one of the major thing which saves the human life to the extent. some show disagree, those peoples have to be asked about the cause of their disagreeeness and their by improving their

3.my suggestions are welcomed by the safety officer

- a. Strongly agree
- b. Agree
- c. Neither agree nor disagree
- d. Disagree
- e. Strongly disagree





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Comments: Nearly 40 persons have expressed their view has neither agree nor disagree, if the suggestion are worthwhile it will be taken into account for consideration and discussion for futher improvement of the culture

VII RECOMMENDATIONS SAFETY MODEL

The basic and necessary precautionary measures can be followed with minimum cost is as follows.

1. All workers should wear helmet (Yellow - Workers, Violet - Supervisors, Green - Safety Engineers, White- Construction Engineers, Red- Electrical Engineers)
2. First aid kit, Fire extinguishers & trained first aid personnel should be provided.
3. Workers should wear safety belt working in height.
4. Safety goggles, Safety shields, and Safety glasses, Safety shoes should be provided.
5. Safe drinking water and Refreshment should be provided.
6. Regular disposal of trash and work place should be safe and clean.
7. Sanitary facilities adequate and clean
8. No use of alcoholic beverages or controlled substances.
9. Adequate lighting and ventilation
10. Power tools properly guarded and inspected proper

VIII SAFETY CULTURE MODEL PREPARATION

Based on the various literature study and data survey result from several construction companies the safety culture model This safety culture model will provide the safety management system to be followed by the companies which facilitates safe work environment.

Safety is looked into from the culture point of view of shared characteristics which include beliefs, values, attitudes, opinions and motivations. The safety culture model which include safety plan, safety rules, safety procedure, safety communication, safety monitoring, safety audit and review.

The below figure represents the safety culture model for small scale construction industries. The perceptions of safety culture as follows

1. Management attitudes towards safety.
2. Perceived level of risk.
3. Effects of work pace.
4. Management actions towards safety.
5. Importance of health and safety training.

IX RESULTS AND SUGGESTIONS

Behavior is both observable and measurable, we can therefore manage behavior. Case study on accidents is studied to analyze the unsafe behavior and unsafe condition. A survey has been conducted to check the behaviour of the workers and Questionnaire is circulated to the construction sites. Statistics analysis graphically represented in charts. Based on the statistics results suggestions are provided to the firm. General safety module is prepared. Hence the following instructions should be given to the workers,

Pep talk and tool box can be given to the workers before starting the work

Weekly once induction programs can be provided to be aware of the working procedures.

Regular training should be given to the workers

Workmen should be encouraged to wear the full body harness in a proper way

People need to be monitored

Tool box talk should be given to the workmen before starting the work

Engineer need to be physically examine the workplace and advise the workmen



Figure 4 Flow diagram to get fewer accidents



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REFERENCES

1. Ahmed, S.M., Kwan, J.C., Ming, F.Y.W. and Ho, D.C.P., (2000), 'Site-Safety Management in Hong Kong', *Journal of Management in Engineering*, ASCE, 16(6), pp. 34–42
2. Andi (2008) Construction Workers Perceptions Toward Safety Culture Journal Of Civil Engineering And Science
3. Antonio S. Vieira Neto, Antonio C. O. Barroso and Adriana Gonçalves (2009) Knowledge Basis In Safety Culture For Researchers And Practitioner. International Nuclear Atlantic Conference
4. M.D. Cooper (2000) Towards a model of safety culture".Journal Of safety Science.
5. D.Cooper (2010) Application In Construction Site Leadership Journal Of Civil Engineering And Science Vol. 32, N. 1: A18-A23
6. Dr.Dominic Cooper C.Psychol 2005 "Surfacing your safety culture". Journal Of Construction Engineering And Management..ISBN 3-8172-4302-02.
7. Dr.Dominic Cooper C.Psychol,2007 Safety Culture Survey, Journal Of Civil Engineering And Science
8. Dianne Parker Mattew Lawrie Patrick HudsonU.S,2013 A Framework For Understanding The Development Of Organizational Safety Culture, Journal Of Safety Science Pg 551–562.