iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 4 **Issue:** IV **Month of publication:** April 2016

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

Volume 4 Issue IV, April 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Creating and Innovative Safety Culture Model for Construction Industries in Chennai

S. Binil Sundar[1], A.Anitha[2]
Asst Professor (SG) – Civil Engineering Department, Saveetha School of Engineering, Saveetha University, Chennai, India. 2nd year Student – Civil Engineering Department, Saveetha School of Engineering, Chennai, India.

Abstract: ***Construction Sector is very essential and an integral part of infrastructure development which gives tremendous boost to our country's economy. The construction industry has registered enormous growth worldwide in recent years. Safety plays vital role in the construction sectors which are widely used in the above sector. This project discuss about safety culture and safety climate. 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. Safety climate is a theoretical term used by safety and personnel professionals to describe the sum of employee perceptions regarding overall safety within the workplace. The objective of this project is to examine the current culture in the workplace regards to themanagement of safety and health and create a safe working environment for the small scale construction company. The methodology isbriefly explained which includes various steps such as review of literature, data collection, SPSS software study, result analysis and developing model for Safety Culture. A questionnaire is prepared based on many criteria such as accidents, safety in emergency period, safety information, workplace hazards, workplace risks, workplace health & safety, welfare and time regulations and finally about review. The Questionnaire prepared is circulated to many construction companies. Data are primarily collected to provide information regarding a specific topic. 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. SPSS software study is done. SPSS is a software package used for statistical analysis. Here descriptive statistics which includes Cross tabulation, Frequencies, Explore and Descriptive Ratio Statistics are done using the SPSS software and results are obtained. The results for the analysis are graphically represented in pie charts and bar charts for various criteria classified in questionnaire. The final conclusion is arrived based on the results and the model of safety culture for construction industries in Chennai has been developed.***

Keywords: safety culture, safety climate, SPSS, descriptive statistics

I. INTRODUCTION

A. General

Construction Sector is very essential and an integral part of infrastructure development which gives tremendous boost to our country's economy. The construction industry has registered enormous growth worldwide in recent years. Although the development of technology is rapid in most of the sectors, construction work is still labour intensive, In India the construction sector employs around 33 million people, which is next to agriculture. Construction is unique compared to other industries. It has been repeatedly stated that each Construction project is different from another by presenting different situations and problems during its execution. Planning and execution under time and budget pressures, temporary workers with various skills, and works influenced by weather conditions and external environments are some characteristics that differs construction projects from projects in other industries. These characteristics make construction projects face hazardous conditions that are potential to cause accidents. Traditionally, safety in construction is the primary responsibility of general contractors and subcontractors, and not designers and construction managers.

B. Safety Culture

Safety culture is the ways in which safety is managed in the workplace, and often reflects "the attitudes, beliefs, perceptions and values that employees share in relation to safety". 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.
It refers to the extent to which individuals and groups will commit to:

©IJRASET: All Rights are Reserved

1) Personal responsibility for safety
2) Act to preserve safety
3) Enhance and communicate safety concerns
4) Strive to actively learn

C. Safety Climate

Safety climate is a theoretical term used by safety and personnel professionals to describe the sum of employee perceptions regarding overall safety within the workplace.

D. Key Differences Culture Vs Climate

Safety Culture is commonly viewed as an enduring characteristic. Safety Culture is the attitudes, values, norms, and beliefs that a particular group of people share with respect to risk and safety. Safety Culture is a group of individuals guided in their behavior by their joint belief in the importance of safety. Safety Cultures build joint responsibility between individuals from management to employee.

Safety Climate is viewed as a temporary state that is subject to change depending on current circumstance. Safety Climate can be defined as a "snapshot" of employee's perceptions of the current environment or prevailing conditions which impact upon safety. Safety Climate varies individually depending on current perceptions and can change daily. Perception of safety procedures and rules are a reflection of safety climate.

E. Objective

1) To examine the current culture in the workplace regards to the management of safety and health.
2) To create a safe working environment for the construction companies in Chennai.

F. Scope

1) To maintain a safe working environment. To minimize our environmental impact.
2) To promote a culture of responsibility for our environment, health, and safety.
3) To continually improve our environment, health, and safety management systems.
4) To prevent significant damage to property other than that of the company.

II. REVIEW OF LITERATURE

A. General

The main purpose of literature review is to give an idea about the work conducted world over in the field of study. In this a brief review of literature about the safety culture and model is reported and discussed. Literature regarding other safety measure is also reported.

B. Literature

M. D. Cooper (2000) describes Organisational culture is a conceptoften used to describe shared corporate values that affect and influence members' attitudes and behaviours. Safety culture is a sub-facet of organisational culture, which is thought to affect members' attitudes and behaviour in relation to an organisations ongoing health & safety performance. However, the myriad of definitions of organisational 'culture' and 'safety culture' that abound in both the management and safety literature suggests that the concept of business-specific cultures is not clear-cut.

Placing such 'culture' constructs into a goal-setting paradigm appears to provide greater clarity than has hitherto been the case. Moreover, as yet there is no universally accepted model with which to formulate testable hypotheses that take into account antecedents, behaviour(s) and consequence(s). A reciprocal model of safety culture drawn from Social Cognitive Theory (Bandura, 1986) is offered so as to provide both a theoretical and practical framework with which to measure and analyses safety culture. Implications for future research to establish the models utility and validity are addressed.

ThanwadeeChinda (2007) describes the developed construction safetyculture dynamic model provides insight into the interactions and influences that each enabler has on improving construction safety culture over time. The construction safety culture index helps an organization to assess how well its safety implementation is performed, and provides guidance on how to plan for safety

©IJRASET: All Rights are Reserved

improvements.

Andi (2008) describes efforts to reduce construction accidents can beinitiated by building good safety culture. Researches concerning safety culture, however, are still limited. This research aims to empirically gauge worker's perception toward safety culture in construction projects. Data were obtained through questionnaire survey to three large construction projects. Data were obtained through questionnaire were gathered and used for subsequent analyses. Results show that in general worker's perception towards safety culture is quite good. Further analysis that worker in the three projects have different safety culture perceptions, especially on factors of top management commitment, safety rules and procedures, communication and worker's competency.

III. METHODOLOGY

A. *Steps Involved*

The methodology is for developing a safety culture model for construction industries in Chennai. The detailed methodology can be explained as follows:

Data collection

Questionnaire survey

Analysis using SPSS Software

Safety Culture Model Preparation

1) Data Collection: Data collection is any process of preparing and collecting data, for example, as part of a process improvement or similar project. 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. Data are primarily collected to provide information regarding a specific topic. Data collection usually takes place early on in an improvement project, and is often formalized through a data collection plan which often contains the following activity.

Pre collection activity - agree on goals, target data, definitions, methods

Collection - data collection

Present Findings - usually involves some form of sorting analysis and/or presentation.

2) Questionnaire: A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. The Questionnaire is prepared based on the criteria such as Accidents, Safety Policies, Fire Precautions and Emergency Evacuation, Information, Instruction, Supervision, Training and Consultation, Workplace Hazards, Workplace Risks, Workplace Health & Safety, Welfare & Working Time Regulations, Review

3) Analysis using SPSS Software: SPSS provides facilities for analyzing and displaying information using a variety of techniques. This document uses version 20 of SPSS for

Windows 7. Here are a few things that will be included in "The basics of Statistics" section.

Mean, variance, Standard deviation, descriptive statistics One sample Statistics

Produce bar charts

Paired sample correlations

IV. RESULTS AND DISCUSSIONS

A. *General*

The results of the statistical analysis and the discussion on those results dealt in this chapter. A model for the evaluation of the safety management system in construction industry was formulated based on the results obtained from the questionnaire survey and structural interviews. One of the objectives of the research is to evaluate the effectiveness of safety management system in construction industry. The objective has been achieved based on the investigation through questionnaire survey, analysis results based on safety practices in construction industry was developed. Finally the chapter offers direction for future research to continue in the context of Indian construction industry.

B. *Descriptive Statistics Results*

Descriptive statistics is the discipline of quantitatively describing the main features of a collection of data. One of the objectives of

©IJRASET: All Rights are Reserved

Volume 4 Issue IV, April 2016
ISSN: 2321-9653

the research is to evaluate the effectiveness of safety management system in construction industry. Even when a data analysis draws its main conclusions using inferential statistics, descriptive statistics are generally also presented. Descriptive statistics shows the mean value of answers for each question in the questionnaire, minimum and maximum answering value and the standard deviation for each question. The following table gives out the entire Descriptive Statistics Results for the complete questionnaire. The result includes the mean, standard deviation, minimum and maximum values.

Table 4.1 Descriptive Statistics Results

Questionnaire	N	Minimum	Maximum	Mean	Std. Deviation
Persons other than workers Visit	50	1	2	1.07	0.254
Safety to Persons other than workers	50	1	2	1.33	0.479
Safety Work Procedure	50	1	2	1.17	0.379
Safety Risk Precautions	50	1	2	1.47	0.507
Accidents Reported to EHU	50	1	2	1.23	0.430
Accident Book	50	1	2	1.47	0.507
First Aid Kit	50	1	2	1.53	0.507
Trained First Aiders	50	1	2	1.37	0.490
Persons in Emergency Situations	50	1	2	1.20	0.407
Worker trained for Fire safety	50	1	2	1.33	0.479
Fire Extinguisher	50	1	2	1.20	0.407
Use of Flammable Liquids	50	1	2	1.37	0.490
Storage for Flammable	50	1	2	1.07	0.254

©IJRASET: All Rights are Reserved

Volume 4 Issue IV, April 2016
ISSN: 2321-9653

Liquids					
Written Safety Polices	50	1	2	1.23	0.430
Risk Assessment at the Premises	50	1	2	1.17	0.379
Record of all significant findings	50	1	2	1.27	0.450
"What you should know" Poster	50	1	2	1.23	0.430
Staff Work Alone	50	1	2	1.10	0.305

Table 4.1 Cont..

Questionnaire	N	Minimum	Maximum	Mean	Std. Deviation
Workrooms Temperature	50	1	2	1.07	0.254
Sufficient Lighting	50	1	2	1.27	0.450
Workplace Clean	50	1	3	1.43	0.568
Waste Stored in bins	50	1	2	1.37	0.490
Workstation Comfortable	50	1	2	1.33	0.479
Computer Usage at least 2hours	50	1	2	1.43	0.504
Insurance Cover	50	1	2	1.27	0.450
Insurance policy for employees	50	1	2	1.27	0.450
Work equipment Movement by employee	50	1	2	1.47	0.507

©IJRASET: All Rights are Reserved

Volume 4 Issue IV, April 2016
ISSN: 2321-9653

Storage of harmful materials	50	1	2	1.10	0.305
Asbestos	50	1	2	1.27	0.450
Work Time Regulation	50	1	2	1.47	0.507
Restrooms	50	1	2	1.43	0.504
Drinking Water	50	1	2	1.50	0.509
Hot Drink(Tea/Coffee)	50	1	2	1.43	0.504
Provision for Pregnant Women	50	1	2	1.37	0.490
Stress Risk Assessment	50	1	2	1.40	0.498
In charge person of H&S	50	1	2	1.43	0.504
Employees Awareness	50	1	2	1.47	0.507
Employees involvement in H&S	50	1	2	1.17	0.379
Organization Face	50	1	2	1.30	0.466

Table 4.1 Cont..

Questionnaire	N	Minimum	Maximum	Mean	Std. Deviation
H&S Policy in Place	50	1	2	1.47	0.507
Policy Effective	50	1	2	1.30	0.466
H&S Training for Employees	50	1	2	1.27	0.450
Records of H&S Training	50	1	2	1.47	0.507
Workrooms Ventilation	50	1	2	1.30	0.466

©IJRASET: All Rights are Reserved

Volume 4 Issue IV, April 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Maintained					
Workrooms Temperature Maintained	50	1	2	1.40	0.498
Sufficient Lighting Provided	50	1	2	1.33	0.479
Workplace Cleanness Maintained	50	1	2	1.43	0.504
Waste Stored in bins cleared daily	50	1	2	1.43	0.504
Workstation Comfortable	50	1	2	1.30	0.466
Computer Usage at least 2hours	50	1	2	1.43	0.504
Work equipment Movement	50	1	2	1.10	0.305

The Table 4.1 shows the values of descriptive statistics which includes minimum, maximum, mean and standard deviation. The tabulation includes results for the entire questionnaire.

1) Accidents: The accident factor includes details about safety work procedure, safety risk precautions, accident book, first aid kit and trained first aiders.

Table 4.2 Cross tabulation result for Accidents

Questionnaire	Yes	No
Persons other than workers Visit	46	4
Safety to Persons other than workers	33	17
Safety Work Procedure	41	9
Safety Risk Precautions	27	23
Accidents Reported to EHU	38	12

©IJRASET: All Rights are Reserved

Volume 4 Issue IV, April 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Accident Book	27	23
First Aid Kit	23	27
Trained First Aiders	32	18
Persons in Emergency Situations	40	10

2) Safety in Emergency Period: The factors relating to safety in emergency period includes Worker trained for Fire safety, Fire Extinguisher, Use of Flammable Liquids, Written Safety Polices and Record of all significant findings.

Table 4.3 Cross tabulation result for Safety in Emergency Period

Questionnaire	Yes	No
Worker trained for Fire safety	33	17
Fire Extinguisher	40	10
Use of Flammable Liquids	32	18
Storage for Flammable Liquids	46	4
Written Safety Polices	38	12
Risk Assessment at the Premises	41	9
Record of all significant findings	37	13
What you should know Poster	38	12
Staff Work Alone	45	5

3) Safety Information: The safety information includes safety instruction, safety supervision, safety training and safety consultation. All these together come under safety information.

Table 4.4 Cross tabulation result for Safety Information

Questionnaire	Yes	No
Company Reviews & Updates	33	17
Process of Risk Assessment	40	10
Safe Systems of Work	32	18
System for Maintaining Plant	41	9

©IJRASET: All Rights are Reserved

Health & Safety Induction Training	35	5
Refresher of Health & Safety	46	4
Employees Consultation about H&S	30	20
Any dangerous Machinery	40	10
Written H&S information provided	33	17
Poster on Injury Management	41	9

C. Recommended Safety Model

The basic and necessary precautionary measures can be followed with minimum cost is as follows.
All workers should wear helmet (Yellow - Workers, Violet - Supervisors, Green - Safety Engineers, White-Construction Engineers, Red- Electrical Engineers)
First aid kit, Fire extinguishers & trained first aid personnel should be provided.
Workers should wear safety belt working in height. Ergonomics risk management
Safety goggles, Safety shields, and Safety glasses, Safety shoes should be provided.
Safe drinking water and Refreshment should be provided.
Regular disposal of trash and work place should be safe and clean. Sanitary facilities adequate and clean.
No use of alcoholic beverages or controlled substances. Adequate lighting and ventilation.
Power tools properly guarded and inspected properly. All portable tools and cords properly grounded.
Ladders & Scaffolding inspected at regular intervals.

V. CONCLUSION

The main conclusions drawn from the project are given below with respect to the following factors.

A. In accidents only 14.1% of construction industry maintains safety first aid kit and others doesn't due to
The safety practices are not followed by the construction companies.
Funding for the safety measures is not sufficient.
Lack of improving the standards of work in systematic manner.
In safety in emergency period only 12.1% of construction industry maintains precautionary measures

B. Safety policies of the companies are not displayed.

Fire precautions should be taken before the accidents Emergency evacuation is not done.
In safety information only 12.4% of construction industry maintains precautionary measures
Process of Risk Assessment should be done. Written H&S information should be displayed. Refresher training for workers to be done.

C. In Workplace Hazards only 11.59% of construction industry maintains precautionary measures
Mechanical Ventilation should be provided. Handrails to the staircases to be provided.
Lifting equipment such as cranes lift are to be tested and serviced regularly.

D. In Workplace Risks only 12.84% of construction industry maintains precautionary measures
Windows and doors opening should be provided and maintained. Equipment used should be serviced and maintained properly.

©IJRASET: All Rights are Reserved

Safe work system is to be provided for doors and windows cleaning.

E. In Workplace Health & Safety only 12.1% of construction industry maintains precautionary measures
Worker moving equipment should be taken care and safety should be ensured.
Computer usage more than 2hrs continuously should be minimized. Waste bins should be placed and cleaned regularly on time.

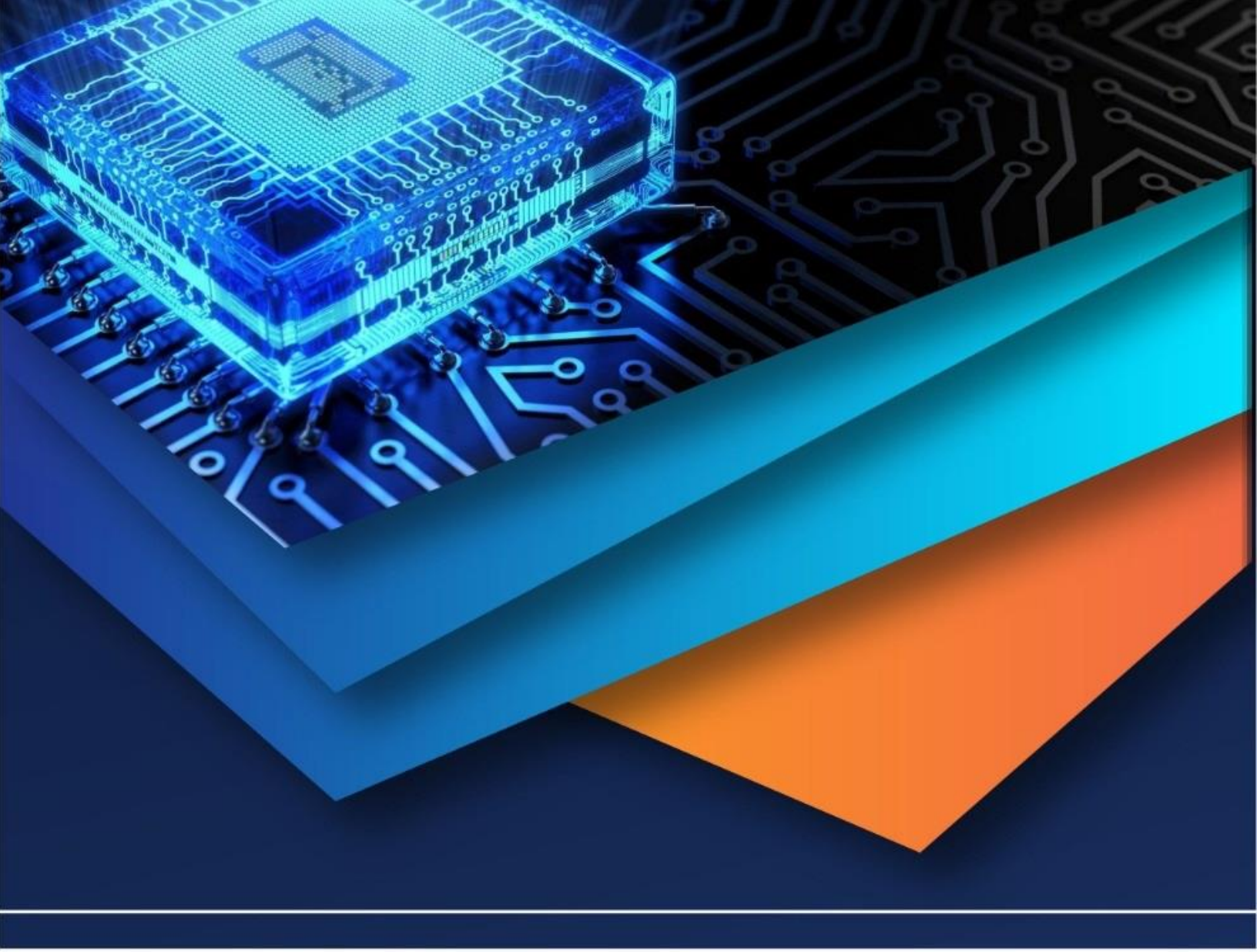
1) In Welfare & Working Time Regulations only 11.74% of construction industry maintains precautionary measures
Safe drinking water should be provided all time to workers. Employee awareness should be created.
Restrooms should be maintained cleanly.

2) In Review only 13.1% of construction industry maintains precautionary measures
H&S polices are not displayed.
H&S training and records are not maintained. Workroom ventilation should be done.

REFERENCES

[1] Abdelhamid, T.S. and Everett, J.G., 'Identifying Root Causes of Construction Accidents', Journal of Construction Engineering and Management, ASCE, 126 (1), pp. 52–60. (2000),
[2] Abudayyeh, O. et al., 'Analysis of Occupational Injuries and Fatalities in Electrical Contracting Industry', Journal of Construction Engineering and Management, 129(2), pp. 152–158. (2003).
[3] Ahmed, S.M., Kwan, J.C., Ming, F.Y.W. and Ho, D.C.P., 'Site-Safety Management in Hong Kong', Journal of Management in Engineering, ASCE, 16(6), pp. 34–42. (2000).
[4] Andi, Construction Workers Perceptions Toward Safety Culture (2008)
[5] Bird, F. and Loftus, R., Loss Control Management, Loganville, Ga: Institute Press, (2006).
[6] Chris Hendrickson., 'Project Management for Construction', Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall Pittsburgh. (2000).
[7] Chew, Y.S., and Chai, LN., 'ISO-9002 in Malaysian Construction Industry', McGraw Hill Book Co. (2001)
[8] Cooper, M.D., 'Improving Safety Culture: A Practical Guide', Wiley, Chichester. (2003).
[9] Cooper, M.D 'Evidence from Safety Culture that Risk Perception is culturally determined', The International Journal of Project & Business Risk Management, Vol 1(2), 185- 202. (2007).
[10] Darryl C. Hil, 'Construction Safety Management and Engineering', Journal of SH&E Research – American society of Safety Engineers, Vol 1 Pg No.717. (2004).
[11] Dominic Cooper C.Psychol, 'Measuring and Improving Safety Culture' The ESH Handbook for the Public Sector , (2005).
[12] Glendon. A. I. and N. A. Stanton, 'Perspectives on safety culture', Safety Science 34 215±2561, (2002).
[13] Guldenmund. F.W 'the nature of safety culture: a review of theory and research. Safety Science', Pg No. 215 – 257, (2000).
[14] Laurence. D, Safety rules and regulations on mine sites—the problem and a solution', Journal of Safety Research, Vol 1 , Pg No.39 – 50. (2005).
[15] Sesé. A, A. L. Palmer 'Occupational safety and health in Spain' Journal of Safety Research, Vol 4, Pg No.511 – 525. (2002).
[16] Steven Yule, 'Safety culture and safety climate: A review of the literature' Industrial Psychology Research Centre, University of Aberdeen, UK. (2004).

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)