

# A Study on the Construction Workers Cultural View Towards Safety Environment

S Nobert Leo Raja, D Kinslin and K.A. Janardhanan<sup>3</sup>

Faculty of Management Studies, Noorul Islam University

\*Corresponding Author - Email: nobertleo@gmail.com

## ABSTRACT

Construction is an on-going process which starts with well-defined construction plans, designing the projects, financing the project till its completion. Construction sector is considered as the prime sector which assists in the socio-economic development of the world. This sector is designated as the industry which increases gross domestic benefits of the developed and developing countries. During the last few decades, the construction industry has provided an enormous growth worldwide. The study was conducted with 146 construction site workers working in various construction sites in Coimbatore, Tamil Nadu. A conceptual model has been developed to assess the safety culture in the construction site and the model includes 6 variables namely attitude toward safety, management support to safety, peer support to safety, safety training, job stress and adequacy of rules & procedures for safety. There are many construction companies that are working in the region. Smart City Construction announces by Central Govt of India to expand the revenue earned from the construction sector. The importance of the construction sector in the development of the national economy cannot be denied. The scales for measuring the variables were derived from the vast body of literature on safety culture and safety climate in organizations. A total of 56 items were included in the final validated questionnaire to measure the safety culture. The data collected from workers of construction sites was analyzed using statistical software tool SPSS 21.0. Different statistical measures were carried out to verify the validity and reliability of the scale. The results of the study show that the workers perceive that they receive better support from their peers in enhancing the safety level in the job site. The improper safety measures and equipment's result in industrial accidents and employment injuries. Moreover, the construction workers in India face many health problems, for instance cervical and spinal disorders. The study also explored the relationship between demographic characteristics of construction site workers and safety culture. The results indicate that demographic variable like gender strongly influences the job stress. Similarly, married sample of the study has better attitude towards safety than the unmarried counterparts.

**KEYWORDS:** Safety, Construction Company, Workers, Coimbatore, India

## 1. INTRODUCTION

Construction workers in India are usually illiterates and mostly uneducated and most of the construction workers work as casual workers. The rate of the employment injuries and accidents has been increasing and this is due to the reason that the construction workers perform physically hard programs without proper safety equipment's under close supervision. According to International Labour Organization (ILO) report (2011), construction industry is one of the most hazardous and accident prone occupation. It has been reported that, globally construction sector accounts of 17 percent of all work-related fatalities (ILO 2011).

In India, both the men and women construction workers equally share the duties of the construction segments. The labour pool of India constitutes the equal partnership of both male and female construction workers. The Indian construction workers constitute a significant part of women workforce and a huge labour force of unskilled workers for the construction purpose. The women are playing a significant part in different segments of construction and rate of the women participation in the construction work has been increasing with the passage of time. The overview of the employment scenario has revealed the true picture of the increased rate of employment of women in unorganized construction sector.

One of the serious issues involving the construction industry is the safety and working conditions of workers in the construction sites. Increasing level of accidents and chronic health related issues are prevalent among the construction workers. It is reported that accident rate in the construction site in India is highest in the world and surveys show that 165 out of every 1000 workers are injured in the construction sector (Indian Labour Organization ILO, 2009). Considering the above facts in foreground, the present investigation was conducted with following specific objectives:

- To review the safety and social security measures provided to the construction workers.
- To develop and validate a scale for assessing the workers perception towards safety culture in construction industry.
- To measure the construction workers perception toward safety culture from the various construction sites in Coimbatore, TamilNadu.

**Review of literature on safety culture:** Larcher, P., & Sohail, M. (1999) describes that the construction workers may experience distinctive work related ailments because of introduction to work and this approach was described by Sparks, et al in 2001.

M. Goldenhar, L., Williams, L. J., & G. Swanson, N. (2003) states that the way of work prompts leads to exhaustion. Dreary work, work power, and length of time of mental work, are a few components that oblige unique consideration. The labours even face uneasiness when there is no work. The presentation to distinctive ecological conditions like commotion, light, and warmth may be in charge of wellbeing weakness. Postural changes like twisting forward or standing may bring about spinal pain, low back agony, neck torment etc. It is additionally connected with weight bearing. As per the International Labour Organization (ILO), Maximum Weight Recommendation, 1967, (No. 128), expressed that a grown-up man can convey up to 55 kg weight, yet a female or feeble individual ought to convey less contrasted with a solid grown-up man.

Artazcoz, L., Borrell, C., Benach, J., Cortès, I., & Rohlfs, I. (2004) states that it likewise proposed that push because of work weight, tedious work, and employment vulnerability was available. Utilization of asbestos in this industry, with 20-40 years direct presentation, may prompt distinctive maladies like lung tumor, dangerous mesothelioma or gastrointestinal malignancy. Other wellbeing impacts incorporate pleural emanation, pleural scarring, pneumonic fibrosis, and adjusted atelectasis. The labours who are presented to crystalline silica can get Silicosis a kind of Pneumoconiosis as well as malignancy. Silica and dust could be smothered by utilizing water at the development destinations. The other health related issues and the relation of these issues with socioeconomic status were described by Artazcoz, L., Borrell, C., Benach, J., Cortès, I., & Rohlfs, I. (2004). He also identified eight components of Safety Climate which are listed below:

- Importance of Safety Training
- Management of Attitudes Towards Safety
- Effects of Safe Conduct on Promotion
- Level of Environmental Risk
- Effects of Work Pace on Safety
- Status of the Safety Officer
- Effects of Safety Conduct on Social Status
- Status of the Safety Committee

DeJoy (2004) identified several key factors regarding workers' perceptions of safety in an organization and his list included Coworker Support, Organizational Support, and Communication.

#### **STUDIES ON SAFETY CULTURE IN CONSTRUCTION SITE**

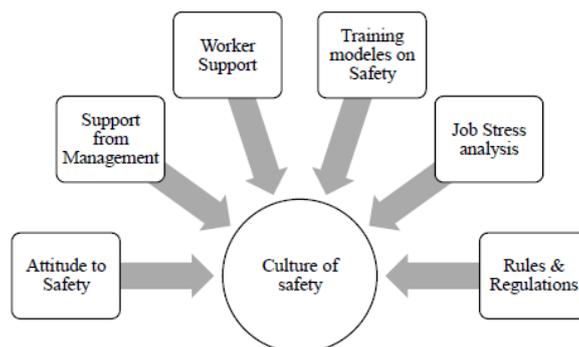
Taylor, A. K., & Murray, L. R. (2013) stated that the standards set for the occupational safety and health organizations of the national and international standards have recommended the precautionary measures and safety equipment's to avoid the serious accidents at work place. Therefore, the construction sector should implement the safety measures and use of the safety equipment. The overview of the construction work conditions at Tamil Nadu has revealed the absence of the safety equipment's for the protection of the construction workers. Further, the standard procedures for performing the construction procedure are often absent. This results in the incidents like fall of the construction workers from a height causing death or serious injuries.

Jayakrishnan, T., Thomas, B., Rao, B., & George, B. (2013) described that they are less taught and not mindful about diverse preventive measures. The major work related maladies in development modern labours obliging consideration are, silicosis, lead harming, ailments of joints and bones, carbon monoxide, and benzene harming, skin illnesses, etc and this aspect was described in detail by Jayakrishnan, et al and the other researchers.

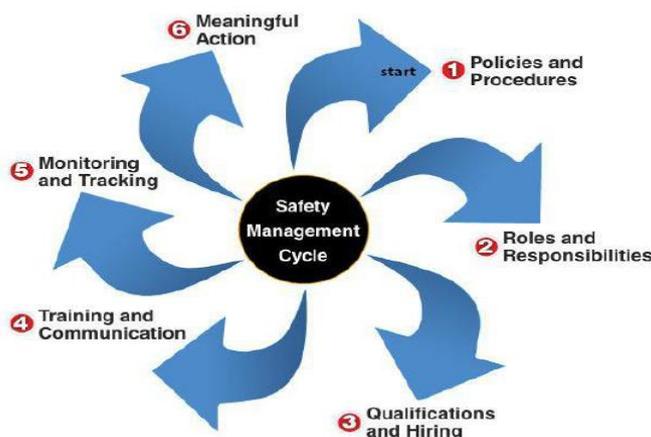
Zanni, G. (2014) describe that the construction workers have a great exposure to lead, while painted. Trouble in breathing most likely because of the vicinity of dust and issue connected with high commotion and vibration generally causes listening to misfortune and Raynaud's disorder, individually. Because of listening to misfortune the specialists talk louder to their associates and relatives with an idea that others are not able to hear him, as he himself can't listen. At the working site they don't clean their hands appropriately which result in diverse sorts of skin ailments that influence their hands and fingers.

#### **CONCEPTUAL MODEL OF SAFETY CULTURE**

The review of literature on safety culture/climate in industries yielded several themes. An analysis of the themes provided better insight into the core theme of the study. As outcome of the study a conceptual model was developed to assess the safety culture in construction site as shown in the Fig.1. Several variables have emerged from the review of literature and based on through investigation and expert opinion six variables were selected to measure the safety culture. The variables identified were Attitude toward Safety, Management Support to Safety, Peer Support to Safety, Safety Training, Job Stress and Adequacy of Rules & Procedures for Safety. The authors of the study used modified version of previously standardized instruments to measure the variables identified for the safety climate and safety management cycle as shown in Fig. 2. The details of the research instrument employed in the study are listed are described in the next section.



**Fig.1. Conceptual Model of Safety Culture**



**Fig.2. Safety Management Cycle**

**Research Instrument:** A questionnaire survey instrument was used in the research study to collect data regarding Attitude toward Safety, Management Support to Safety, Peer Support to Safety, Safety Training, Job Stress and Adequacy of Rules & Procedures for Safety. The instrument was prepared based on inputs collected from the extensive review of literature. The items from the validated questionnaire were modified and rephrased to suit to the sample of the current study. The details of the questionnaire used in the study are described below.

**Attitude Towards Safety:** The study measured the construction site workers beliefs and feelings about safe working condition, safety activities and safety rules. A seven item scale developed by Rundmo (1998) was slightly modified in the present study to assess the attitude to safety. The scale was rated on a 5-point Likert response scale ranging from 1 (strongly disagree) to 5 (strongly agree) and were scored in such a way that higher values corresponded to a higher level of positive attitude toward safety climate.

**Support From Management Towards Safety:** Several studies points that organizations which reported low injury rates have strong management commitment to safety. Thus better safety culture can be expected in the firms in which management supports high standards of safety, ensures better communication between workers and management regarding safety issues, well-established safety training process LTI policies with awards were issued to support and create safety awareness in the work culture. Hence the study included measures to assess the management support to safety. The few items were derived from Safety Climate scale (Zohar & Luria, 2005) to construct management support to safety climate. The scale consisted of 12 items and the items has the response format (one = "strongly disagree" to five = "strongly agree"). The higher values of score corresponds to higher level of management support to safety.

**Peer Support to Safety:** This scale was developed from safety climate scale of Zohar & Luria (2005). The scale consisted of 12 items and the items has the response format (one = "strongly disagree" to five = "strongly agree"). Higher scale values signifies higher level of peer support in ensuring safety of construction site workers.

**Safety Training:** Several researches have shown that the major causes of accidents in the construction site are related to the unique nature of the construction industry, human behaviour, difficult worksite conditions, and poor safety management (Abdelhamid & Everett, 2000). An awareness about the safety precautions could be helpful in averting the accidents and related injuries. Thus the model included a scale to assess the level of training imparted to the workers to enhance the safety culture. Safety training scale was derived from the work of Zohar & Luria (2005). The scale consisted of 12 items and the items has the response format (one = "never" to five = "very often"). Higher scale values signifies higher level of peer support in ensuring safety of construction site workers.

**Stress:** A modified version of 8 item “The Workplace Stress Scale” developed by Marlin Company and the American Institute of Stress (2009) was used to measure the job stress of the construction workers. The response format of the scale ranges from one = “never” to five = “very often”. Higher score values of the scale indicate high levels of job stress.

**Rules & Regulations for Safety:** A 5 item scale was used to measure the extent of availability of rules and procedures for safety in the work. The response format of the scale ranges from one = “small extent” to five = “large extent”. Higher score values of the scale indicate greater prevalence of rules and procedures in the work site.

## 2. METHODOLOGY

The study was conducted with the randomly selected sample of construction site workers from large residential projects in and around Coimbatore, Tamil Nadu. Around 146 workers from 10 constructions sites participated in the study. The sample consisted of 85 Male (58%) and 61 Female workers (42%) as shown in Fig. 3. Table 1 provides the demographic characteristics of the sample of the study.

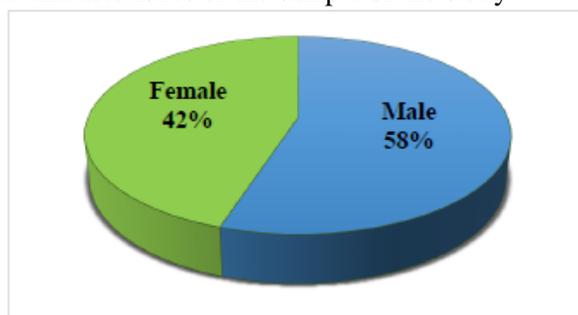


Fig.3. Gender Distribution

Table.1. Demographic Characteristics of the Respondents

Particulars	Variable	Frequency	Percentage
Age(Years)	Below 25	51	35.0
	25-40	88	60.0
	Above 40	7	5.0
Marital Status	Married	88	60.0
	Unmarried	58	40.0
Education	Illiterate	88	60.0
	Primary	36	25.0
	Secondary	22	15.0

## 3. RESULTS AND DISCUSSION

The descriptive statistics of the scale showing the mean values and standard deviation are presented in the Fig. 4. The results indicate that the perceived peer support for safety was higher among the sample of the study ( $M=4.2$ ,  $SD=0.656$ ). The respondents feel that the friendly and cordial relationship among the workers enhances the safety of co-workers in a better way. However, the results also reveals that respondents of the study are subjected to severe job stress ( $M=4.3$ ,  $SD=0.565$ ). The aggravated stress level can be attributed to the uncertainty in the construction work, language barriers and wage related issues. In addition, workers need to shift from one location to another, whenever the project is completed. This particularly affect their morale as they need to accustom to new place and family safety has to be ensured. Even though the perceived management support to safety was fairly better in terms of mean value for the scale ( $M=3.6$ ), Management support is not uniformly present across the organizations. Workers of few construction site reported that organization support for safety has been poor, which is evident from the higher deviations from the mean value ( $SD=0.920$ ). Majority of the workers participated in the study divulged that fairly better policy frameworks, standard rules and regulations are existing in the organizations to improve the safety culture. Amendments in the existing rules are communicated to the workers. However, the extent to which the rules and regulations are followed needs to be investigated.

**Reliability Analysis:** Reliability measures the “degree of interrelatedness among a set of items designed to measure a latent variable” (Netemeyer et al, 2003). Cronbach’s coefficient of alpha is usually used to assess reliability. It can range from 0.0 to 1.0. A higher Cronbach’s coefficient of alpha indicate that items on a scale are consistent with each other and might be assessing the same latent variable. And a lower reliability signifies the items on a scale may be assessing multiple latent variables. The reliability statistics of the scales used in the present study is presented in Table 2. It can be seen from the table that the alpha value for all the scales were well above the cutoff value of 0.6. This indicates that the scale can be used for the study reliably.

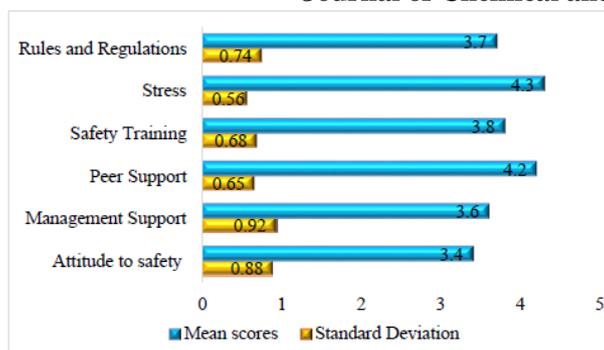


Fig.4.Descriptive Statistics

Table.2.Reliability Analysis

Factors	Alpha, $\alpha$
Attitude to safety	0.856
Management Support	0.758
Peer Support	0.891
Safety Training	0.812
Stress	0.945
Rules and Regulations	0.720

**Correlation Analysis:** Pearson's Correlation Coefficient ( $r$ ) was used to assess the convergent validity of the scale. The correlation coefficient was calculated for each item of the scale and the total of each field (Table 3). The p-values (Sig.) are less than 0.05 for all fields, so the correlation coefficient of all safety culture dimensions are significant at  $p = 0.05$ , hence the questionnaire is consistent and valid to be measure what it was set for.

Table.3.Correlation Analysis

Factors	Pearson Correlation Coefficient	p-value
Attitude to safety	0.721	0.000
Management Support	0.510	0.000
Peer Support	0.432	0.000
Safety Training	0.354	0.000
Stress	0.632	0.00
Rules and Regulations	0.545	

**Relationship between Personal Characteristics and Safety Culture:** Many studies have shown that the demographic characteristics of the respondents of the study can influence the safety culture of the organization. Hinze (1997) shows that the demographic variables can influence safety climate and consequently influence the individual safety behavior.

Independent sample t-test was used to test the influence of demographic variables on the safety culture. The statistical results shows that gender of the respondents does not influence the individual variables of the safety climate like attitude to safety, management support, peer support, safety training and rules and regulations. However, significant differences were observed between male and female respondents in their rating for perceived level of stress in the jobsite ( $t=3.17$ ,  $p<0.01$ ). The reason could be attributed to the nature of Indian culture where women has to take care of most of household chores including child rearing in addition to their daily work in construction site. The analysis also revealed that marital status of the construction site workers has a positive influence on attitude to safety ( $t=2.84$ ,  $p<0.01$ ). In other words, married workers have better attitude toward safety than unmarried counterpart. Other demographic variables does not have significant influence on the variables of safety culture.

#### 4. CONCLUSIONS

The measurement of safety culture in organization offers several benefits in managing overall safety levels across various activities in the firms. The variables identified in the study were proved to be effective in gauging the safety culture in the construction industry. The results of the evaluation revealed that the perceived level of overall safety culture is better in all the construction sites considered for the study. However, it is necessary to highlight the limitations of the study. The response of the workers in the survey might be influenced by the certain factors beyond the control of the researcher. As a result, a longitudinal study can be conducted to verify the validity of the responses in the study. Truthfulness of the responses is another issue in this kind of studies. Hence, further studies for investigating the safety behavior is recommended as an extension of the present study.

Further, it is suggested that the management of the organizations and managers of construction projects should proactively monitor the safety of the workers performing the actual construction on-site. An extra effort is

required on the part of higher level management to ensure that the laid out rules and regulations are followed in the construction sites. Similarly, training should be considered as an ongoing activity, not as one time solution to all the problems. It is recommended that the management could initiate measures to alleviate the job stress among the workers. Psychological aspects of the work conditions might be taken into consideration in the training interventions to build confidence among the workers.

An enhanced safety culture will not only minimize accidents and injuries but also improve the productivity of the organization in many ways. Absenteeism, turnover of potential workers will be curtailed. Better trained workers add value to the organization, promote safe working environment, maintain balance between personal and professional life.

#### REFERENCES

- Abdelhamid TS, & Everett JG, Identifying Root Causes of Construction Accidents, *Journal of Construction Engineering and Management*, 126(1), 2000, 52-60.
- Cohen A, Factors in Successful Safety Programs, *Journal of Safety Research*, 9, 1977, 168-178.
- Dedobbeleer N and Beland F, A Safety Climate Measure for Construction Sites, *Journal of Safety Research*, 22, 1991, 97-103.
- DeJoy DM, Schaffer BS, Wilson MG, Vandenberg RJ, Butts MM, Creating Safer Workplaces: Assessing the Determinants and Role of Safety Climate, *Journal of Safety Research*, 35, 2004, 81-90.
- Fang D, Chen Y, and Wong L, Safety Climate in Construction Industry: A Case Study in Hong Kong *Journal of Construction Engineering and Management*, 132(6), 2006, 573-584
- Flin R, Conner PO and Bryden R, Measuring Safety Climate: Identifying the Common Features, *Safety Science*, 34 (1-3), 2000, 177-192.
- Glendon AI and Litherland DK, Safety Climate Factors, Group Differences and Safety Behavior in Road Construction, *Safety Science*, 39(3), 2001, 157-188.
- Hinze J, *Construction Safety*, New Jersey: Prentice Hall Publications, 1997.
- Ibrahim ME, & Al Hallaq KA, Safety Climate for Site Engineers in Construction Sites, *IUG Journal of Natural and Engineering Studies*, 122 (1), 2014, 43-58.
- International Atomic Energy Authority (IAEA), Summary Report on the Post Accident Review Meeting on the Chernobyl Accident 75-INSAG-1. IAEA, Vienna, 1986.
- Kennedy R, Kirwan B, Development of a Hazard and Operability Based Method for Identifying Safety Management Vulnerabilities in High Risk Systems, *Safety Science*, 30, 1998, 249-274.
- Mohamed S, Safety Climate in Construction Site Environments, *International Journal of Construction Engineering and Management*, 128 (2), 2002, 375-383.
- Rundmo T, Organizational Factors, Safety Attitudes and Risk Behaviour, Main Report. Prepared for Norsk Hydro, (1-68 + Appendices) Trondheim: Rotunde Publikasjoner, 97, 1998, 24.
- Spielholz P, Transit S, Ngo S, Stahl D and Al-Mukhtar M, Measuring and Improving Safety Climate in Your Organization. In 2010 Rail Conference, 2010.
- Zohar D, Safety Climate in Industrial Organizations: Theoretical and Applied Implications, *Journal of Applied Psychology*, 65, 1980, 96-102.