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Using Safety Climate Factors for Improvement of Safety Performance in Construction

Abstract:

This briefing discusses the safety and health problems in the construction industry. The focus is on improvement in safety performance by using safety climate factors. Construction organization can assess their safety climate leading factors by using a safety climate questionnaire and develop plans for improvement of safety performance. The outcomes of assessment of safety climate can be regarded by as predictors or indicators of safety performance. This can be used by construction organization to address the weak areas associated with safety climate.

1. Introduction:

Worldwide occupational injury rates in construction are high as compared to all other major industries (Lehtola et al 2008). Unlike other industries such as manufacturing, construction is composed of a transient workforce (Kadefors, 1995; Dubois and Gadde, 2002) where project personnel from different cultures and backgrounds are expected to work together in a constantly changing work organization and structure. Construction is always risky because of outdoor operations, work-at height, complicated on-site plant machinery and equipment operation coupled with worker's attitudes and behaviours towards safety (Choudhry and Fang, 2007). Statistics published by the International Labor Organization (2015) indicate that at least 108000 workers are killed on construction site every year, a figure which represents about 30 per cent of all occupational fatal injuries. Data from a number of industrialized countries show that construction workers are 3 to 4 times more likely than other workers to die from accidents at work. In the developing world, the risks associated with construction work may be 3 to 6 times

greater. In the UK, the injury costs in the construction sector account for over half (US\$ 0.7 billion) of the total costs associated with health and safety (US\$ 1.29 billion) and approximately 7% of the total costs of health and safety (US\$ 20.43 billion) across all industries (HSE 2014/2015).

Costs associated with accidents in the construction industry can be categorized as direct and indirect costs. Direct costs tend to be those associated with the treatment of the injury and any compensation offered to workers as a consequence of being injured and are covered by workmen's compensation insurance premiums. Indirect costs include reduced productivity for both the worker(s) and the crew or workforce, clean-up costs, replacement costs, costs resulting from delays, supervision costs, costs related to rescheduling, transportation, and wages paid while the injured is idle (Hinze, 1994). Research conducted in the UK showed that indirect costs are eleven times more than direct costs (Movement for Innovation, 2003). In the USA, the total cost of accidents constitutes 6.5% of the value of completed construction (The Business Roundtable, 1995), and in the UK it is approximately 8.5% of the tender price (Anderson, 1997).

From a practical point of view appropriate methods, equipment and systems should be used in construction for workers' health and safety. However, in a construction environment the situation is all the more challenging, where projects differ considerably in terms of size, location and complexity. Moreover, safety can impact all stages of a project from planning to operation. Over the past century, the focus on factors influencing safety and safety improvements within industries has been changed and expanded. Hale and Hovden (1998) describe three ages of safety: the technical age (1920's), the human factor age (1970's) and the management system

age (1980's). The third wave or age of safety expanded the focus to include safety culture. The concept of safety culture was first introduced and defined after the Chernobyl accident in 1986 (INSAG, 1992). Nowadays, the concept of safety culture and safety climate attracts much attention across a broad number of industries and sectors (Clarke, 2000). One of the reasons for this is that a rich safety culture and a mature safety climate are some of the most important factors in achieving a safe workplace.

Although the meaning and definition of the term safety culture remains a subject of deliberation and debate, it is generally accepted that safety culture has an impact on safety performance. Recent UK research concluded that factors that contribute negative and positive safety cultures in construction includes; organizational factors, individual factors, team factors, job design factors, management factors and supervisory factors (Wamuziri, 2013). It should however be noted that safety climate and safety culture are distinct but related concepts.

2. Defining Safety Climate:

The safety climate on a specific construction project refers to managements' and workers' shared perceptions of the adequacy of the safety and health programs and the consistency between the organization's espoused safety policies/procedures and the actual conditions at the jobsite (CPWR (2014)). It is the combination of safety climates from multiple organizations including the project owner, construction manager/general contractor, and subcontractors and it may be influenced by local conditions such as project delivery, scheduling, planning methods and existing norms amongst involved trades (CPWR (2014)).

3. Using Safety Climate for Improvement of Safety Performance:

Safety climate is assessed by means of quantitative, psychometric questionnaire surveys, so-called 'safety climate scales', measuring the shared perceptions/opinions of a group of workers on certain safety-related dimensions or factors. The outcome of such safety climate scales are regarded as a predictor or indicator of safety performance. The Nordic safety climate questionnaire (NOSAQ-50), developed by a group of researchers at National Research Centre for the Working Environment at Denmark (Kines et al. 2011), consists of 50 questions across seven safety climate dimensions and uses a scale of 1-4 (strongly agreed – strongly disagreed). This questionnaire is available in over 25 languages, and results from around the world are currently being collected in an international database in order to allow for benchmarking and further development. The Center for Construction Research and Training (CPWR (2014)) suggests the assessment of the following safety climate factors on a scoring scale of 1-5 (strongly agreed – strongly disagreed):

1. Demonstrating Management Commitment
2. Aligning and Integrating Safety as a Value
3. Ensuring Accountability at All Levels
4. Improving Supervisory Leadership
5. Empowering and Involving Workers
6. Improving Communication
7. Training at All Levels
8. Encouraging Owner/Client Involvement

These safety climate factors can be measured among different categories of staff working in construction organization or in a project undertaken by the construction organization. The results will reflect the safety climate of organization or safety climate of the specific project. After the assessment of safety climate factors, construction organizations will be able to identify and prioritize the weak area for improvement. Safety climate leading factors can be reviewed on a five level scoring scale to assess what level of safety culture for that factor is achieved by construction organization. Maturity level for all the factors can be classified as unformed, reactive, complaint, proactive and exemplary. Construction organizations can make short term (1-2 months), mid-term (6-12 months) and long term (1-2 years) plans if the required level for the factors is not adopted by using different ideas. The process of safety climate from assessment towards a mature level is shown in figure 1.

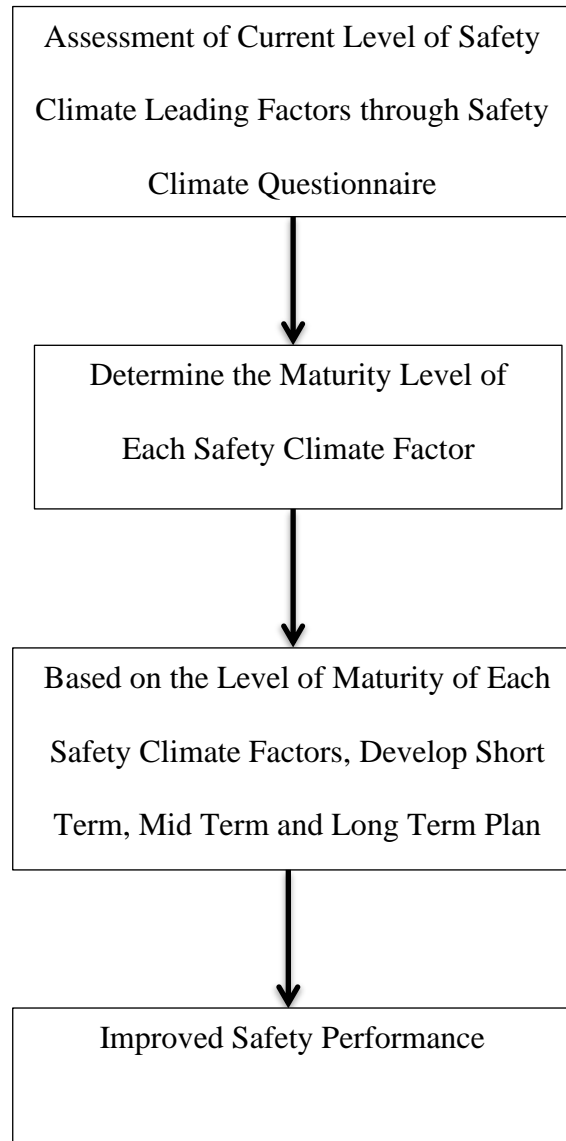


Figure 1. Process of Using Safety Climate to Improve Safety Performance

4. Conclusion:

Rich safety culture and mature safety climate are important factors which can help in improving the safety performance of construction organization. The method of assessment of safety climate factors is explained in this article. Such assessment can help the construction organization to make plans for achieving the required level of safety climate maturity. Safety climate is one of the concept which can improve safety performance, however alone safety climate is not the key

that can ensure that accidents will not take place on construction sites. The construction organization size could be one of the factors which can restrict to adopt this concept of improving safety performance; therefore the effectiveness of using safety climate factors in different size of construction organizations needs to be evaluated.

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