A suggested color scheme for reducing perception-related accidents on construction work sites

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A B S T R A C T

Changes in workforce demographics have led to the need for more sophisticated approaches to addressing the safety requirements of the construction industry. Despite extensive research in other industry domains, the construction industry has been passive in exploring the impact of a color scheme; perception-related accidents have been effectively diminished by its implementation. The research demonstrated that the use of appropriate color schemes could improve the actions and psychology of workers on site, thereby increasing their perceptions of potentially dangerous situations. As a preliminary study, the objects selected by rigorous analysis on accident reports were workwear, safety net, gondola, scaffolding, and safety passage. The colors modified on site for temporary facilities were adopted from existing theoretical and empirical research that suggests the use of certain colors and their combinations to improve visibility and conspicuousness while minimizing work fatigue. The color schemes were also tested and confirmed through two workshops with workers and managers currently involved in actual projects. The impacts of color schemes suggested in this paper are summarized as follows. First, the color schemes improve the conspicuity of facilities with other on site components, enabling workers to quickly discern and orient themselves in their work environment. Secondly, the color schemes have been selected to minimize the visual work fatigue and monotony that can potentially increase accidents.

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1. Introduction

The construction industry is one of the most accident-prone industries, and workers risk fatal injury, hospitalization, and disability. Construction-related industrial accidents, in particular, comprise a high percentage of serious occupational injuries. For example, in 2009 Korea’s Ministry of Employment and Labor reported that out of the 209,686 workers registered in the construction sector, 18,896 workers filed for some form of industrial accident (MEL, 2010). This value represents 21.3% of the total incidents reported to the Ministry. Furthermore, 27.6% of these incidents resulted in fatalities: this result is the highest percentage of fatalities among all industry sectors.

Accident prevention in the construction industry has been approached from multiple perspectives, ranging from improved safety management procedures to the adoption of safer construction technologies. Notably, many researchers have focused specifically on identifying the reasons behind accidents and on developing safety systems (Baradan and Usmen, 2006; Fredericks et al., 2005; Loosmore and Andonakis, 2007; Patterson and Shapbell, 2010). Information Technologies have been implemented on construction sites as a preemptive measure of potential accidents (Navon and Kolton, 2006; Teizer et al., 2007). Recently, safety issues have been studied in conjunction with ergonomics, psychology, health and hygiene, systems engineering and sociology (Carvalho et al., 2008; Parker et al., 2003; Larson et al., 2008; Zohar, 2008).

As construction projects become larger and more complex (e.g., high rise buildings, long span bridges), there is a strong need to modernize and update safety procedures to prevent new types of accidents and address the changing demographics of the working population. The concentration of accidents and their severity in the construction industry can be partially attributed to the aging of the workforce in the national work force. In terms of safety, middle-aged and older workers are more susceptible to accidents due to loss of perception and agility. Literature in other industries has addressed issues of verifying the correlation between accidents and elderly workers’ loss of perception (Albers and Estill, 2007; Burmedi...