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Investigating ethnic minorities' perceptions of safety climate in the construction industry

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ABSTRACT

Introduction: An increasing number of ethnic minorities (EMs) have been employed in the construction industry to alleviate severe labor shortages in many countries. Unfortunately, statistics show that EMs have higher fatal and non-fatal occupational injury rates than their local counterparts. However, EMs are often underrepresented in safety climate (SC) research as they are difficult to reach and gauge their perception. A positive relationship has been widely found between SC and safety performance. Understanding the safety perceptions of EMs helps to reduce injuries and improve their safety performance. *Method:* Based on a sample of 320 EMs from 20 companies in the construction industry, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to identify the SC factors of EMs, and validate the extracted factors, respectively. Multivariate analysis of variance was undertaken to examine mean differences in perceptions of SC by personal characteristics. *Results:* Three SC factors for EMs encapsulating 16 variables were identified through EFA. The hypothesized CFA model for a three-factor structure derived from EFA showed a satisfactory goodness-of-fit, composite reliability, and construct validity. *Conclusions:* Three SC factors were identified, namely: (a) safety management commitment, safety resources, and safety communication; (b) employee's involvement and workmate's influence; and (c) perception of safety rules, procedures and risks. The perceptions of SC differed significantly by nationality, marital status, the number of family members supported, and drinking habit. *Practical applications:* This study reveals the perception of EMs toward SC. The findings highlight the areas for safety improvement and provide leading indicators for safety performance of EMs. The findings are also enlightening for countries with a number of EMs, such as the United Sates, the United Kingdom, Australia, Singapore, and the Middle East.

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1. Introduction

The construction industry has been perceived to be dirty, difficult, and dangerous compared with many other sectors (Siegel, 2011). Local workers have become reluctant to join the construction sector. Labor shortage and aging problems arise in the construction industry of developed and developing societies (Chan, Javed, Lyu, Hon, & Wong, 2016). Recruitment of ethnic minority (EM) or migrant workers in the society or from overseas has become a global practice (e.g., Polish and Baltic construction workers in Europe; Nepalese workers in Qatar; Indian workers in Dubai and Singapore; Hispanic workers in the United States; and Nepalese and Pakistani workers in Hong Kong). It is a solution to economic pressures, an opportunistic use of migration streams and visa rules, as well as a possibility to circumvent all kinds of labor regulations and unionization. In the United Kingdom (UK), elementary construction occupation was one of the top 10 occupations of foreign workers, in which around 8% of workers were foreign-born (Rienzo, 2016). This proportion in Spain has reached 30% (Meardi, Martín, & Riera, 2012). Hispanic or Latino made up 28.9% of the total employed persons in the U.S. construction industry in 2016 (U.S. Bureau of Labor Statistics, 2016). Malaysia began depending on immigrant workers in the 1980s, and approximately 69% of construction workers are foreign workers (Abdul-Rahman, Wang, Wood, & Low, 2012). In Singapore, foreign construction workers were 315,500, accounting for approximately 64% of total construction workforce in 2016 (Ministry of Manpower Singapore, 2016a, 2016b). Male ethnic minorities (EMs) working in the Hong Kong construction sector reached to 4656 (Census and Statistics Department, 2013, p. 7).

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Problems pertaining to safety have emerged with the growing employment of migrant workers. A total of 1239 Nepalese and Indian workers were reported to die in the three years to the end of 2013 in Qatar (Stephenson, 2014) and it was conservatively estimated that there would be at least 4000 more deaths of Nepalese and Indian migrant workers before the start of the World Cup in 2022 (International Trades Union Confederation, 2014). The percentage of migrant worker fatalities to the total construction labor deaths in the UK increased from 3% in 2002 to 17% in 2008, which exceeded the expectation (Health and Safety Executive, 2011). Tutt, Pink, Dainty, and Gibb (2013) pointed out that EMs in the UK face a relatively higher risk and are more vulnerable to fatal and non-fatal injuries than local workers. Compared with non-Hispanics, Hispanic construction workers in the United States are revealed to have a disproportionate amount of occupational fatalities and injuries (Goodrum & Dai, 2005; Hallowell & Yugar-Arias, 2016). The situation is similar in Hong Kong. A comprehensive search in local newspaper archives revealed that the fatalities of EMs accounted for nearly 6.4% (N = 22) of all construction fatalities (N = 343) from 2000 to 2016, 2nd quarter, whereas EMs represented around 1.5% of the construction workforce (Hong Kong Labor Department, 2016).

The high accident rates of EMs may result from their unsafe behaviors. Nevertheless, instead of criticizing EMs' unsafety behaviors, organizational factors requires to be examined, which can influence workplace safety behavior (Griffin & Neal, 2000). Safety climate (SC), as a key organizational factor, helps to reveal the priority in organizational safety. The efficacy of organizational SC in fields of research and practice has been demonstrated by its significant influences wildly found on safety behaviors, safety motivation, safety knowledge, accidents, and injuries (Christian, Bradley, Wallace, & Burke, 2009; Clarke, 2006; Cooper & Phillips, 2004; Hecker & Goldenhar, 2014; Lu & Yang, 2011; Mearns, Whitaker, & Flin, 2003; Neal, Griffin, & Hart, 2000). However, previous SC studies in the construction industry have yet to consider the case of EMs.

Given the different levels of safety standards and safety practices in their home countries, EMs tend to have different safety perceptions from their local counterparts. Previous research indicates that the safety awareness of migrant workers is relatively low (Dainty, Gibb, Bust, & Goodier, 2007). Some workers may ignore the importance of safety management and fail to realize the harmful effects of heavy construction work on them. The majority of the workers do not have sufficient language skills and therefore encounter communication barriers (Bust, Gibb, & Pink, 2008; Dainty et al., 2007; Trajkovski & Loosemore, 2006). Some EMs have difficulties in understanding instructions given to them in the local language (Santoso, 2009). EM workers are considered as reserved and quiet, and can accept risky work without confrontations because of the fear of losing their jobs (Brunette, 2004). Such disparities may influence the perception of SC to a certain extent (Peckitt, Glendon, Booth, & Rowlinson, 2004); thus, the perception of EMs toward SC may differ from that of the local workers. In light of that, due attention should be directed to the SC factors for EMs.

This study aims to investigate the EMs' perceptions of SC in construction industry. It first determines the SC factor structure from the perspective of EMs. Moreover, it attempts to explore mean differences of perceptions of the determined SC among different EM groups. The research significance lies in deepening the understanding of EMs' perceptions of SC, highlighting the areas for safety improvement, and providing the leading indicators for the safety performance or safety behaviors of EMs.

2. Safety climate factors

The concept of "safety climate" was initially introduced by Zohar based on a survey of 20 Israeli manufacturing companies. Zohar described SC as "a summary of molar perceptions that employees share about their work environments … a frame of reference for guiding appropriate and adaptive task behavior" (Zohar, 1980). SC is viewed as a concerted perception of the true priority of safety at a workplace, which has been regarded as an important organizational construct for improving safety performance (Hon, Chan, & Yam, 2012, 2014). It can help to measure the organizational safety management practice and diagnose the defects in safety management that may result in injuries (Hinze, Thurman, & Wehle, 2013; Zohar, 2010).

Given that the SC factors are regarded as industry-specific (Cooper & Phillips, 2004; Zohar, 2010), SC studies that focused on determining the SC factors in context of construction industry have been reviewed in order to compare the SC factors of local and EMs workers, as shown in Table 1. Dedobbeleer and Béland (1991) studied the SC structure developed by Brown and Holmes (1986) and derived a two-factor SC structure for the construction industry. Niskanen (1994) conducted a SC study separately for workers and supervisors in road maintenance, road, and bridge construction sector. Niskanen's study resulted in four SC factors for workers and supervisors. Glendon and Litherland (2001) conducted a study with 192 respondents in the Australian road construction projects. These researchers identified six SC factors that encapsulate 32 items. Mohamed (2002) developed an 80-item questionnaire for Australian construction SC and identified 10 SC factors.

Some recent studies are from Hong Kong and mainland China. Fang, Chen, and Wong (2006) designed an 87-item SC questionnaire and tested it in Hong Kong. The study extracted 10 underlying SC factors. Choudhry, Fang, and Lingard (2009) identified two SC factors that

Table 1
Common SC factors in the construction industry.

SC factors	Research articles	Number of research articles (N)
Perception of safety regulation, rules, and safety practice	Glendon and Litherland (2001), Mohamed (2002), Fang et al. (2006), Zhou et al. (2008), Choudhry et al. (2009), Zhou et al. (2010), Hon et al. (2012), Seo, Lee, Kim, and Jee (2015), Wu, Song, Wang, and Fang (2015)	9
Safety management commitment	Dedobbeleer and Béland (1991), Mohamed (2002), Fang et al. (2006), Zhou et al. (2008), Choudhry et al. (2009), Zhou et al. (2010), Hon et al. (2012), Seo et al. (2015), Wu et al. (2015)	9
Workers' involvement	Dedobbeleer and Béland (1991), Mohamed (2002), Fang et al. (2006), Zhou et al. (2008), Choudhry et al. (2009), Hon et al. (2012), Wu et al. (2015)	7
Safety attitude	Niskanen (1994), Fang et al. (2006), Zhou et al. (2008), Zhou et al. (2010)	4
Safety resources	Glendon and Litherland (2001), Fang et al. (2006), Zhou et al. (2008), Zhou et al. (2010)	4
Supervisor's and workmate's influences	Fang et al. (2006), Zhou et al. (2008), Zhou et al. (2010), Seo et al. (2015),	4
Safety communication	Glendon and Litherland (2001), Mohamed (2002), Seo et al. (2015), Wu et al. (2015)	4
Risk taking behaviors	Mohamed (2002), Fang et al. (2006), Zhou et al. (2008),	3
Work pressure	Glendon and Litherland (2001), Mohamed (2002)	2
Competence	Mohamed (2002), Fang et al. (2006)	2
Relationships	Glendon and Litherland (2001)	1
Responsibility for health and safety	Hon et al. (2012)	1

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