

# The Role of the Big Five Personality Factors on Accident: A Case of Accidents in Construction Industries

Mehdi Pourmazaherian<sup>1</sup>, Shadiya Mohammed S. Baqutayan<sup>1</sup>, and Durishah Idrus<sup>1</sup>

<sup>1</sup>Perdana Centre of Science, Technology & Innovation Policy, Razak Faculty of Technology & Informatics, UTM

\*Corresponding Author: mehdi@gmail.com

## Abstract

Limited research has been undertaken to explore how construction workers' personality affects safety behaviour. Most of previous literature in field of health and safety especially in construction industry have been focusing on managerial, non-occupational accident or somewhat other aspect accident causation. Indeed, construction is known as one of the most dangerous industries globally, therefore, this study estimates the importance of personality traits in relation to risk behavior at workplace. The objective is to review and identify which dimension of personality traits (big five model) are more affective on occupational accident to suggest new model that is helpful in construction industry in order reduce the accident rate. Finding showed that neuroticism, agreeableness and conscientiousness compare to the other personality traits are more affective on both occupational/non occupational accidents, while, the effect of agreeableness and conscientiousness on improving safety performance was overwhelming. On the other hand, there is little evidence to show meaningful and efficient connection between occupational accident and extraversion. Extraversion and openness were appropriate only to effect on non-occupational accident. Finally, this research presents the appropriate model which is worthwhile to improve the safety performance in construction industry.

*Keywords:* Personality Traits; Occupational Accident; Safety; Construction industry

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## ■ 1.0 INTRODUCTION

Safety is defined as human well-being pertaining to the surrounding environment. Safety at work is a complex phenomenon, and the subject of safety attitudes and safety performance in the construction industry is even more so. Where man and work interact, particularly in such a complex and uncertain environment as construction, there are bound to be problems of human behaviour, weather effects, and unforeseen circumstances resulting in accidents. In fact, safety concept always has been crucial for safety practitioners.

On the other hand, from the past decades, most of the scholars in field of safety and health believed that the human errors have the greatest impact on the occurrence of accidents. Nevertheless, currently, researchers try to focus on the important issues of the human factor, which is psychological factors that can effect on attitude of the workers toward the safety. They want to recognize that how managers and owner of the industries can reduce the rate of accident and fatality at their workplace by improving the dimensions of psychological factors. With attention to this fact that construction industries have been known as most dangerous industry in terms of accident and fatality rate, serious and complicated effort is needed in order to improve the safety performance (Babiker, 2015). Thus, this study tries to review the previous literature to contribute to better understanding of psychological aspect of accident.

## ■ 2.0 THE PSYCHOLOGICAL ASPECTS OF ACCIDENT IN WORKPLACE

A pioneer in the field of research in the area of occupational safety was Heinrich (1959), who assigned the causes of accidents to two main categories such as human error and Technical and organizational problems; thus, he stated that in the category of human error (Man), there are psychological factors that related. And the

most important psychological factors, which cause accidents, are associated with: mental unsuitability, and a lack of attention or carelessness (Heinrich, Petersen, Roos, & Hazlett, 1980). In the same way, other researchers such as Atherley, Booth, and Kelly (1975) and Sawacha, Naoum, and Fong (1999) believed that accidents are caused by human elements and human error. He concludes that changes in attitudes and changes in human behaviour can reduce human error, and the human elements in accidents. Based on S. Zhang, Shi, and Wu (2017) one of the internal factor that can effect on the individual's safety behavior is psychological factors.

According to Sukor, Tarigan, and Fujii (2017) there is significant connection between the psychological factors and risky behaviors; in fact it can shape the behavior of the individual to follow safety rules. In this way, another scholars believed that some dimensions of psychological factors such as supervisor safety behavior and workmates safety behavior can affected on safety performance (Sawacha et al., 1999). In this regard, it seems construction industries as one of the most dangerous industry especially in developing countries need to focus more on personal and individual aspects of safety performance to improve the quality of the safety at workplace. With respect to these literatures, this study tries to discuss the current approach about the influence of personnel selection to improve the safety performance in construction industries. This area is exactly where the practitioners should develop their surveillance.

### ■ 3.0 THE IMPORTANCE OF PERSONNEL SELECTION ON WORKER'S PSYCHOLOGY AT CONSTRUCTION SITE

Personnel selection is a systematic process by which individuals in a relevant applicant pool are matched to a specific job through a selection procedure. In fact, the main purpose of personnel selection is to use evidence collected from the selection procedure to make precise predictions about candidate's future job performance and control his/her behaviour as well as their psychological wellbeing. Actually, personnel selection can determine the high qualify personnel to perform the job (Drew, 2014). Organizational human resources Human resource organizational functions increase employee value life cycle by implementing strategic talent management processes such as personnel selection.

Human Resources Management (HRM) literature has recently shifted focus from control-orientated approaches that is depend on the rules to enforce behaviours and ensure compliance, to commitment-oriented strategies that elicit effective performance by supportive work practices (Kidombo, K'Obonyo, & Gakuu, 2012; Pfeffer, 1998). Selective employing as a commitment-oriented approach has received the empirical attention in the workplace safety literature (Cheema, Hussain, Ishaq, Asim, & Ullah, 2014; Edgar & Geare, 2013). In this approach, other scholars stated that organizations with lower injury incidents have more elaborate selection procedures than higher injury counterparts (Drew, 2014; Okoye, Okolie, & Ngwu, 2017; Wilde, 2013).

In this way, the scholars try to analyse the job to gain the clear understanding of worker behaviour and requirements (García-Izquierdo, Vilela, & Moscoso, 2015). Worker requirements are commonly described as knowledge, skill, abilities and other characteristics (KSAOs). Basically, Knowledge is defined as the degree to which an employee is needed human resources management to know certain technical material. On the other hand, skill represents adequate and suitable performance on tasks requiring the use of tools, equipment, and machinery. Abilities are physical and mental capacities to do tasks not necessitating the use of tools equipment and machinery. Finally, other characteristics mention to personality, interests, or motivational attributes. In fact, this part is exactly where construction industries are involving the variety of the problems. The reason is that workers are generally unskilled or semiskilled, temporarily employed, exhibit low productivity and low knowledge rates, and often migrate in a group from one place to another in search of work (Kumar & Kumar, 2012). The information that gained through job analysis will be used to develop assessment content that will validly and reliably predict important organizational success criteria, such as safety performance and well-being. In actual fact, Assessment content includes several important constructs that reflect KSAO's identified in the job analysis (French, 2013).

Nowadays, there is a special need to perform the job analysis in order to hire the competence employee especially in construction industry. As a result, job analysis contributes to the management of what KSA's are necessary for someone performing a job.

### ■ 4.0 INDIVIDUAL DIFFERENCES AND JOB PERFORMANCE

Psychologists believed that no two individuals are exact duplicates; they differ from each other in some way or the other. Indeed, the enduring differences between individuals have been one of their central concerns over the past 100 years or more, thus, their job is to identify and understand this uniqueness in individuals. Furthermore determining a person's standing on particular individual difference variables, require

psychologist's to predict how well he or she will perform in a specific job, on the basis of an established relationship between the characteristic under consideration and job performance.

#### **4.1 Big Five Personality Traits**

From the past decades, researchers were started to focus on behavioural aspect of the safety performance; in other word, they tried to explore the relationship between various individual differences and safety performance (Hansen, 1988; Lawton & Parker, 1998). Goldberg (1981) was the first person who named the personal characteristics (neuroticism, extraversion, openness, agreeableness, conscientiousness) the ‘‘Big Five’’; he stated that personal characteristics can provided an accurate theoretical framework to analyse personality. Likewise some scholars such as Cacioppo and Freberg (2015) believed that personality is a complex and each person may show behaviours across several dimensions; he demonstrated that behaviour involves an interaction between a person's underlying personality and situational variables. Choudhry and Zafar (2017), pointed out that These personality traits represent the most important qualities that shape social landscape of individuals.

Actually, Personality traits are conceptualized as stable individual difference characteristics explaining an individual's satiation to specific patterns of behaviour, cognitions and emotions. Big five models have recognized empirically a five-factor structure of personality, which includes the dimensions of Extraversion, Agreeableness, Conscientiousness, Emotional Stability (or Neuroticism), and Openness to Experience or Intellect (from here on the term Intellect will be used). Based on previous literature there is significant connection between Big Five personality traits with both safety outcomes and behaviours. This study tries to demonstration that how personality traits (big five personality) can effect on safety behaviour of the employee and how it can improve the overall safety performance.

#### **■ 5.0 PERSONALITY TRAITS AND SAFETY PERFORMANCE**

Based on the investigation of Shaw and Sichel (2013) most small portion of individual are often responsible for the majority of workplace accidents, early investigations regarding individual difference antecedents of safety behaviour were concerned with the accident prone person. In a researches that conducted by Clarke and Robertson (2005) and Drew (2014) have been demonstrated that several personality traits known as predictor of safety performance and accident incidence. In the same way, other researches demonstrated the role of individual differences and personality traits on accident at workplace (Tao, Zhang, & Qu, 2017). In fact, there is a body of empirical study and researches that prove the links between personality traits and accident involvement. In line with this, other researcher emphasised that personal traits such as normlessness and altruism strongly effect on unsafe behaviour (Beanland, Sellbom, & Johnson, 2014; Scott-Parker, Hyde, Watson, & King, 2013). Equally, other study that conducted in construction industries identified the significant relationship between personality, unsafe behaviours, and the extent of injury (Sing, Love, Fung, & Edwards, 2014).

Another evidence that presented by Christian, Bradley, Wallace, and Burke (2009a) identified that personality traits could be undertaken to minimize accidents in the long term. Furthermore, Ford (2011) stated that all accidents are preventable through analysing a person's personality traits and predisposition to commit unsafe acts or behaviour. Lastly, similar study in field of health and safety, corroborated that personality is directly associate with accident (Harbeck & Glendon, 2013) .

In contrast, some of the researchers such as Furnham and Saipe (1993) believed that personality traits did not predict accident involvement. Another scholars such as Furnham and Saipe (1993), Jinnah and Stoneman (2016), Harbeck and Glendon (2013) and Ulleberg and Rundmo (2003) believed that the role of personality traits on accident is overwhelming but they can effect on accident indirectly only by mediating some factors such as attitude toward safety. In fact, despite the existence of several literatures on relationship between personality traits and accident, there are numerous points that should be addressed before the research evidence could be applied to accident prevention. For instance, some personality traits have different effects on safety behaviours and accidents in different studies in terms of significance and value. In this regards this study investigated and explore each personality trait and its connection to accidents. This may suggest that different dimensions of the Big Five are associated with accidents in different contexts. For instance, international literature and data on fatal accidents address that extraversion and neuroticism are related to road, but not occupational, accidents. Thus, in this regard, this study investigates and explores each personality trait

separately and tries to demonstrate their connection to accidents. Several empirical researches have supported a significant relationship between extraversion and accident involvement; for example, Powell, Hale, Martin, and Simon (1971) found that the number of accidents experienced by mill workers was significantly higher for extraverts.

### **i. Extraversion**

Overall, previous literature on extraversion and accidents indicated three type relations which are positive correlation, negative correlation and no correlation. For example, some scholars such as Powell, Hale, Martin, and Simon (2000) found that the number of accidents experienced by manufactory' s workers was significantly higher for extraverts. In the same way, other study reported there is significant connection between extraversion and being injured in accidents (Barling, Kelloway, & Iverson, 2003; Habibi, Karimi, Shahreza, Mahaki, & Nouri, 2016; McMeen & Templeton, 1989).

In contract, other researches demonstrated in their result that there is no correlation between these two variables (Barrick, Mount, & Li, 2013; Clarke, 2016). Although, other study represents the opposite relationship between extraversion and safety at workplace (Andel, 2015; Broadbent, Cooper, FitzGerald, & Parkes, 1982). In fact, still is not clear that how the mechanism is working when extraverts have higher accident liability; based on previous research specially the researches that have been conducted in industry, the result de monstrated that because extraverts have a lower level of vigilance, they will be less involved in tasks and, therefore, more like to be involved in accidents (Andel, Hutchinson, & Spector, 2015; Eysenck & Wilson, 2013; Yazdani & Siddiqi, 2013). Furthermore, another mechanism relating extraversion to accident involvement concerns the lower level facet of excitement-seeking; actually, high sensation workers are more willing to take risks (Clarke, 2016; Ucol-Ganiron Jr, 2012). The literature demonstrates a complex picture, with a comprehensive evidence for both positive and negative relationships between extraversion and accidents. Although, previous literature showed that extraversion is more related to non-occupation accident, this study suggested that the effect of extraversion on accident involvement will be significantly moderated by context, both occupational and non-occupational, (Clarke & Robertson, 2005).

### **ii. Neuroticism**

The most effective measure of personality is the contrast between compatibility or emotional stability and incompatibility or neuroticism. psychological experts have defined that individuals who are more likely to experience negative emotions such as fear, sadness, clumsiness, anger, guilt and hatred sets up the gamut of this factor (Piedmont, 2013). In fact, according to Joseph, Jin, Newman, and O'Boyle (2015), Vance (2016) and Jesus F Salgado (2002) there is significant relationship between emotional stability and higher job performance and safety behaviour. According to Eysenck (1970), individuals high in neuroticism will be more accident -involved. In the same way, there is evidence that neurotics are less likely to seek active control of the environment; in fact, several studies support a positive relationship between neuroticism and accidents (Hansen, 1989; Selzer, Rogers, & Kern, 1968). Based on Buck (2011) neuroticism is a valid and generalizable predictor of accidents. In a work-related context, construction workers who have high neuroticism described significantly more work accidents and greater dissatisfaction (Sutherland & Cooper, 1991). There is significant evidence to show that neuroticism positively can effect accident especially in construction industry (Sertyesilisik, Tezel, Giritli, & Vatansever, 2016).

The fact is that mechanism of neuroticism to accidents is related to neurotics' response to stress. In other word, reactions to stressors, including anxiety and fatigue, have the effect of reducing performance capacities, such as reaction times and judgment, increasing the probability of errors in construction industry (Biggs, Wang, Mohamed, Colquhoun, & Dovan, 2016; R. P. Zhang, Lingard, & Nevin, 2015). Thus, support for a positive relationship between neuroticism and accident involvement is recommended. Furthermore, based on the review of the literature, neuroticism can drive both occupational and non-occupational accidents. It is necessary for safety practitioners to focus more in this aspect of the personality traits when they try to make safety policy for their organization.

### **iii. Agreeableness**

The fact is that people who have high in agreeableness are pleasant, tolerant, tactful, helpful, not defensive and generally easy to get along with (Hough, 1992). As said by Chan, Chan, and Choi (2010) the workers with high agreeableness were more like to follow safety roles. In general, low agreeableness such as pleasant, tolerant, helpful were found to be important predictors of accidents (Di Milia et al., 2011). There is some empirical evidence to support a negative relationship between agreeableness and accident involvement (Cellar et al., 2001), although other studies have found no association (Arthur & Graziano, 1996).

As mentioned before Agreeableness includes elements of trust, compliance and altruism that are reflected in studies examining personality and accidents; but the point is that each aspect of the agreeableness has different relation with accident. For instance, Davids and Mahoney (1957) found a significant negative relationship between trust and accident involvement in workers at a US process engineering plant. In contrast, other studies in field of measuring the effect of personality on safety indicated that low altruism, egocentricity and selfishness have a significant positive relationship with accident involvement (Conger et al., 1959; Drew, 2014). Overall, reviewing the literatures suggests that facets of low agreeableness are significantly related with accident occurrence, perhaps because of higher emotional arousal and an inability to cooperate effectively with others.

#### **iv. Openness**

Openness is one of the least studied of the Big Five personality dimensions in terms of job performance; In point of fact, openness to experience is a tendency to enjoy new intellectual experiences and ideas. Similarly, there are little studies that conducted on openness and accident involvement, compared with the other personality traits. For instance, some scholars such as Arthur and Graziano (1996) found little evidence about relationship between openness accidents. However, other studies have examined some of the facets of openness. Other researchers demonstrated that there is negative significant between openness and accident; in other word, workers who are characterized by imagination, artistic sensitivity, intellectual curiosity, independence and broad interests they get less prone to accidents (Al-Shehri, 2015).

Different literature investigated different dimensions of openness in relation with occupational/non-occupational accident. For instance, based on the study of Phillips and Rumsey (2008) and Suhr (1961) there is a negative relationship between imagination and accidents. In contrast, a positive relationship was found by Lardent (1991). In other study, positive relationships have been supported between artistic, literary and accident involvement (Conger et al., 1959; Parker Jr, 1953). As result, imaginative, curious and unconventional individuals may be more liable to rule violations, experimentation and improvisation specially in a working environment, where safety compliance is important. Accordingly, based on review of the literature, individual with Low level of openness would have an improved ability to focus on the task are less likely to become accident-involved.

#### **v. Conscientiousness**

In general, previous meta-analyses such as Barrick and Mount (1991) and Jesús F Salgado (1998) reported a tendency for conscientiousness to correlate well across criterion measures of job performance. As respect to this matter, researchers believe that conscientiousness is characterized by competence, order, achievement striving, self-discipline, and deliberation (Costa & McCrae, 1989; McCrae & John, 1992; White, Poulsen, & Hyde, 2016). Some scholars such as Clarke and Robertson (2005) described that low conscientiousness was valid and generalizable predictors of accident involvement. Correspondingly, Research has supported an association between conscientiousness and behavior in line with Gellar et al.'s (2006) suggestion. For example, individuals low in conscientiousness tends to engage in impulsive behaviors, ignoring potential consequences to themselves or others (West et al., 1993).

Review of literature showed that conscientiousness systematically represents relationships with accident occurrence (Christian et al., 2009a; Clarke & Robertson, 2005). In reality, Christian, Bradley, Wallace, and Burke (2009b) focused only on conscientiousness as a predictor of safety performance because most studies considering personality predictors of safety performance have focused on this factor of the Big Five Model. There is also evidence to show the role of conscientiousness in terms of safety performance, with empirical studies supporting significant negative correlations between conscientiousness and accidents (Arthur & Graziano, 1996). Other researchers such as Grill, Grytnes, and Törner (2015) stated that conscientiousness has positive effect on safety performance especially construction industry. There is significant evidence that demonstrated, low scores on conscientiousness are positively associated with accident involvement (Hansen, 1989; Kadiri et al., 2014). By way of explanation, individuals with low in conscientiousness have lack self-control and demonstrate carelessness. As result, the literature suggests that conscientiousness correlates well across safety performance; previous researches have supported an association between conscientiousness.

## **■ 6.0 DISCUSSION**

As we mentioned before the main purpose of the present study was to estimate the importance of personality traits and in relation to risk behavior at workplace. With respect to this matter, reviewing the literature has been shown that some of the Big Five personality categories have a small-to-moderate positive correlation with accident involvement especially for in case of occupational incident. Based on literature, agreeableness and conscientiousness compare with the other personality traits have more influence in accident

occurrence. In fact, low in agreeableness and low in conscientiousness are more impressive and superior to other dimensions in terms of influencing on accident. Basically, the literature demonstrates that conscientiousness and agreeableness are important antecedents of safety performance. On the other hand, there is little evidence to show an efficient connection between occupational accident and extraversion. In other word, in terms of occupational accident, low agreeableness low conscientiousness and neuroticism were crucial predictors of the both occupational and non-occupational accidents, while extraversion and openness were affective merely on non-occupational accident. Reviewing the literature provide a comprehensive evidence about existing relationship between the personality of the workers and their accident in construction sites. The findings herein provide the strong information for discovering how personality of workers can lead to unsafe behavior.

In fact, literature proved that there is connection between all dimensions of personality traits and accident. But the fact is that different dimensions of the Big Five are associated with accidents in different contexts as depicted in figure 1, therefore, the following framework expresses the quality of this relationship.

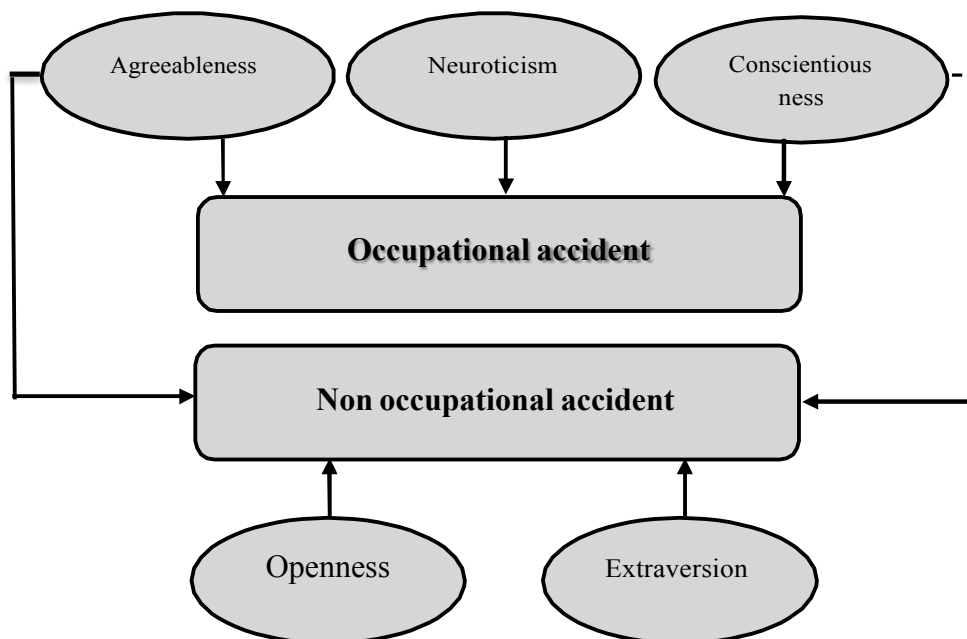


Figure 1: Big Five dimensions in relation with accident

Based on previous studies, eliminating, or at least minimizing accident rates is the ultimate target of any safety-management study. Thus, this study confirmed that there is a lack of adequate and appropriate attentions on personnel selection process in order to hire competent workers in a workplace. Inasmuch as job performance is usually affected by personality traits, it can also affect job performance; therefore it is crucial for all managers to be more attentive to this subject.

Previous studies merely analyzed and identified personality traits, with some focusing on impacts of personality traits on non-occupational accidents, such as driving accident (Sgourou, Katsakiori, Goutsos, & Manatakis, 2010; Tao et al., 2017; Wu, Liu, Zhang, Skibniewski, & Wang, 2015). Other studies on field of occupational accident and personality traits, without mentioning specific industries, remains limited to exploring how construction workers' personality affects their safety behavior and how they tend to follow unsafe acts.

This study also reported beneficial resources suggesting accident reduction via personnel selection process, which is a promising new approach to corporate safety. There is still a lack of work on personnel

selection in the construction industry. We established that before hiring people for tasks in a construction project, their personalities should be examined to gauge the probability of them committing unsafe tasks. Basically, the majority of the study illustrated that hiring an unsafe worker may pose a serious danger to the safety management system.

In the context of the construction industry, this study suggests that the establishment of group norms for safety-related behaviors, such as approaching team members involved in unsafe acts, would have a significant impact on accident involvement. Actually, individuals with high level of agreeableness and conscientiousness may be more amenable to development of such group norms, and more responsive in applying group standards and norms to their own behavior. This would suggest that teams with a high level of agreeableness and conscientiousness would be more effective in terms of safety-related outcome, and can finally improve the overall safety performance. We present a new model based on personality traits, as in figure 2, which is more applicable to construction industry, as both factors are directly related to the competence of workers at workplaces.

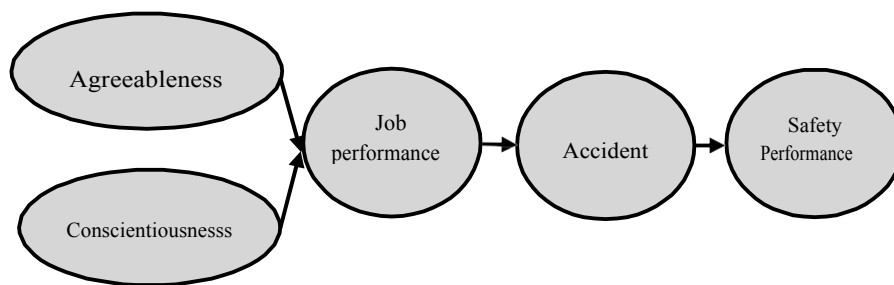


Figure 2: Suggested model based on personality traits for improving safety performance

## ■ 7.0 IMPLICATIONS AND CONCLUSIONS

This research is a valuable first step to identify effective hiring strategies to employ safer workers at workplace; thus, supporting personnel selection as a proactive approach to safety management. In effect, this is not to say that other interventions or causations should be abandoned or that the organizational or environmental context of workplace accident is not critically relevant in understanding safety performance. Instead, it is suggested that personnel selection process is likely to have a wide spread impact on safety and organizational outcomes and hiring an unsafe employee may pose a serious threat to the integrity of any safety management system (Kaplan & Tetric, 2011). With respect to this matter, this study reviewed and analyzed the dimensions of big five model in order to find the suitable model for construction industry. In this review, have been demonstrated three components of big five model such as agreeableness and conscientiousness and neuroticism are related to occupational/ non occupational accident. Other components for example openness and extraversion are more effective on non-occupational accident. The fact is that this study was designed to identify and prioritize the factors related to the competency of workers in construction environments of a developing country. The findings on the impact of skill, motivation, and personality traits on the competency of workers help as a standard for the construction managers in their endeavors to improve workers' competency in order to reduce the accident. Furthermore, this research provides the construction managers realize which factors to target to bring quick and radical improvements in the competency of construction workers.

On the other hand, the findings presented here are among the first to show that safe workers are likely better workers; this is good news for organizations, with high rate of accident, which are interested in pursuing selective hiring as a safety management strategy. Generally, hiring safer workers can prevent future corrective interventions and engender safer work environment. Hiring for safety also sends the message that safety is important to incumbents and applicants, further communicating the value of safety as a top organizational priority and contributing to more positive organizational safety climates.

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