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# Exploratory Factor Analysis of Employee's Actions towards Health and Safety Compliance in Construction

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## Abstract

Unreasonable rates of accidents both permanent and non-permanent disabilities and even fatalities are found to be common among the construction industry. The purpose of the study was to determine employee's actions towards Health and Safety (H&S) compliance in construction. Delphi survey method of data collection was used to generate information from academicians and construction professionals (experts). Questionnaires were completed by respondents based on provided indicator or measurement variables to predict employee's actions towards H&S compliance in construction. The ratings of the questionnaire were based on either the impact was considered to be very high, high or medium. The analysis of the data was done using Microsoft EXCEL and the results were presented in charts. Findings from the study showed three measurement variables to have reached consensus using Inter-Quartile Deviation (IQD) with strong consensus and very high impact. Further Exploratory Factor Analysis (EFA) showed five indicator variables to be the determinant of H&S compliance. It can be concluded from the findings that employee's actions are very significant in deriving health and safety compliance in the construction industry.

**Keywords:** Exploratory factor analysis, employee's actions, compliance, health and safety.

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## 1. Introduction

Occupational Safety and Health (OSH) is concerned with preserving and protecting human and facility resources in the workplace (Friend and Khon, 2007). Hence, standards and guidelines were developed to help the employers and employees to develop their OSH management system. But employees do often go contrary to the aforementioned and leading to occupational safety and health hazards daily worldwide. However, laws and regulations may refer to certain standards and make compliance with them compulsory (British Standard, 2009).

Unsafe actions of employees leading to accident within the work environment is likely to occur when management fail to institute OHS regulations and enforce it. Hence, Creation of positive safety culture within any work environment requires the participation of all workforce, as well as effective communication and trust among all role players (Boshoff (2015). Technical failure and inadequate training coupled with harsh work environment and unsafe methods of working inter alia are among the causes of non-compliance with OSH regulations Othman (2012). Idubor and Osiamoje (2013) posited that safe work environment can determine how issues of compliance with OSH regulations are taken care of by construction firms. Moreover, adequate Occupational Health and Safety (OSH) training and education enhance the OSH performance e.g., compliance with OSH regulation. This paper attempts to substantiate how employee's actions will contribute to H&S compliance in the construction industry. The paper discussed employees' attitude towards H&S compliance in the construction industry.

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## 2. Research Design/Methodology

Nine experts participated in the study and this number was considered adequate based on literature recommendations from scholars who have previously used the technique. Hallowell and Gambatese (2010) suggested a minimum of eight panelist since most studies incorporate between eight and sixteen panelists. The size of a panel is also related to the characteristics of the study, number of experts' available, geographical representation and capacity of the facilitator. The experts were made up of academics and construction professionals. The rating of the questionnaires was based on the impact of other factors in predicting safe act of workers towards H&S compliance. Microsoft EXCEL, spread-sheet software was used in the analysis of the data obtained. Descriptive statistics such as means, median, standard deviations and derivatives of these statistics were the output from the analysis. The results were presented in a form of a table and a bar-chart.

Further, Social Sciences (SPSS) version 20 software Package was used to evaluate the reliability, discriminant validity and convergent validity of the instrument. The Exploratory Factor Analysis (EFA) based on the 269 cases and discussion in this paper is based on Factor one (F 1) which had five (5) indicator variables as shown in Figure 1. The factor extraction method used to determine the unidimensionality of the elements during the Exploratory Factor (EFA) was Principal Axis Factoring with Oblimin Rotation (PAF Oblimin). The Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was based on the method used by Farrington (2009) to assess the factor-analysability of data.

## 3. Safe Acts of Workers and Attitudes

Good safety behaviour of employees at their workplace and approach to work can lead to the reduction accidents in the construction industry (Makin & Sutherland, 1994; Christian et al., 2009). The safety needs of employees lie with the employers because it is the requirements of OSH implementation. Hence the formation of good safety behaviour in the construction industry as pointed out by Christian et al., (2009) through effective implementation of occupational safety and health. Both the employer and the employee have similar perception of the respective responsibility of each party for health and safety (H&S) at workplace. The employer is knowledgeable on the set of rules and regulations governing H&S at workplace and the general wellbeing of his employees (Elgood, Gilby and Pearson, 2004). Employees' behavior has been one of the greatest determinants at workplace leading to their safety because their behavior plays a significant role at workplace and contribute to prevention of injury (Schulz, 2004). This argument has been supported by Mustapha, Aigbavboa and Thwala (2016) and indicated that employee's safe act contribute immensely to health and safety compliance in the construction industry.

However, compliance with OHS regulations is one of the management efforts to determine if it correlates with OSH performance.

Four types of requirements for ensuring compliance in an organization

'Static' requirements: requirements for parts of the organization that do not change often, such as requirements for a building (fire-proof doors, presence of a sprinkler system, etc.).

Technical requirements: requirements for technical measures and maintenance.

Performance and monitoring requirements: requirements that entail taking measurements (of concentrations, annual obligations or amounts), keeping records or drawing up reports (including reports, measurements and studies by third parties).

Organizational requirements: for matters such as training and instructing personnel (SCCM, 2012)

Idubor and Osiamoje (2013) opined that organizational requirement should paramount of which adequate OSH training and education will enhance the OSH performance e.g., compliance with OSH regulation. Other methods for guaranteeing compliance include:

A checklist which is gone through at defined intervals;

Frequent measuring, recording and reporting (these can be kept up to date in a register or overview of measurements, records and reports);

Laying down the method in procedures or instructions which are ensured by means of internal audits;

Translating requirements into action linked to officers and recording these actions once carried out (SCCM, 2012).

Smallwood (2010) posited that attitude is a key to understanding employees' behavior and prevention of on-site-job injuries. Hence, employees must have adequate training on safety programme (Schulz, 2004) and organisations must undergo a cultural change to filter any sort of attitudinal change that may occur to every employee (Schulz, 2004). Central to this culture is the feeling that safety is a top priority and nothing else. There will be improvement in H&S practices if attitudinal change is put under control. Christian, Bradley, Wallace and Burke (2009) were of the view that accident in the construction industry can be reduced through more sensitive or good safety behaviours of both employees and employers. Ineffective implementation of OSH will lead to bad

safety behaviour. Moreover, OSH implementation requires employers to cater for the safety needs of their employees and employees (Labour and Human Resources Statistics, 2001-2005, 2009 in Christian et al., 2009).

#### 4. Findings and Discussion

Results from the study revealed that varying impact on the employee's actions towards H&S compliance were observed by the experts from the sixteen indicator variables (Figure 1). Three attributes (ensure equipment /tools are in good condition before usage, ensure the use of personal protective equipment (PPE) and ensure proper positioning of tasks) were considered by the experts to have reached consensus with IQD cut-off ( $IQD \leq 1$ ) score. This score implies the measurement variables have very high impact (VHI: 9.00-10.00) on employees' safe acts towards H&S compliance and indicates strong consensus. Consensus was also reached on nine other measurement variables with IQD cut-off ( $IQD \geq 1.1 \leq 2$ ) score. The IQD score indicates good consensus for the nine measurement variables and the impact on H&S compliance was high (HI: 7.00-8.99). Four measurement variables reached consensus with IQD cut off ( $IQD \geq 2.1 \leq 3$ ) score, which indicates weak consensus on the measurement variables and impact on H&S was medium (MI:5.00-6.99). Using the median as a means of reaching consensus, fourteen (14) attributes were considered to have reached consensus, with the exception of two measurement variables (avoid annoyance and horseplay at the workplace and do not service equipment that is in operation) which did not reach consensus as shown in Figure 1.

From the impact ratings of the factors, findings revealed that 4 of the factors or measurement variables have a very high impact (VHI: 900-10.00), while 8 other factors or measurement variables have high impact (HI: 7.00-8.99). The remaining four other indicator variables or measurement variables have medium impact (Figure 1).

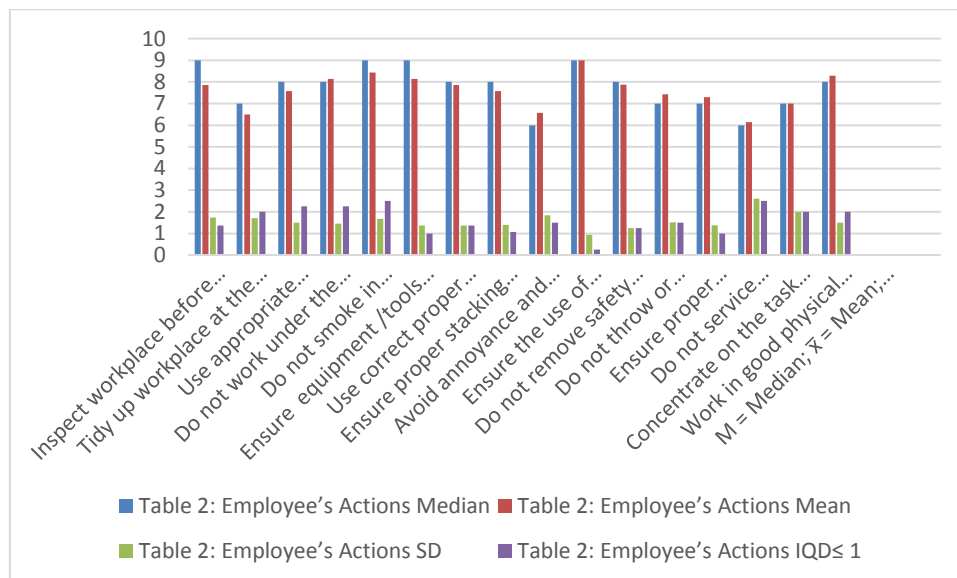


Figure 1: Safe Act of Workers

The measures of reliability, convergent and discriminant validity for each of the indicator variables or measurement variables realised through EFA (Figure 2) are discussed. Five items were realised at the end of the EFA (Figure 2). The corrected item-total correlation was greater than the suggested cut-off value of 0.30 suggesting that the items were good measures of the element and the Cronbach alpha was greater than 0.807 at 0.808 indicating acceptable internal reliability (Nanually and Bernstein, 1994). The Kaiser-Meyer-Olkin (KMO) of 0.886 with Bartlett's Test of Sphericity of  $p < 0.000$  were also obtained, indicating consistency with the recommended KMO cut off value of 0.70 and Bartlett's Test of Sphericity of  $p < 0.05$  suggested by Hair et al., (2010). These results suggested that factor analysis could be conducted with the data. The communality were also above 0.3 and the in Total Variance Explained fourteen (14) indicator variables or measurement variables were above 1.00. Eleven items (SAW 1-SAW 6 and SAW 11-SAW 15) were dropped during the EFA. The factor loadings for all items ranges between 0.5593 and 0.778 (Figure 2). The lower value of 0.5593 was greater than the recommended value of 0.40 as suggested by Field (2005) and Hair, Bush & Ortinau, 2002) for Confirmatory Factor Analysis (CFA) to be conducted on the measurement variables.

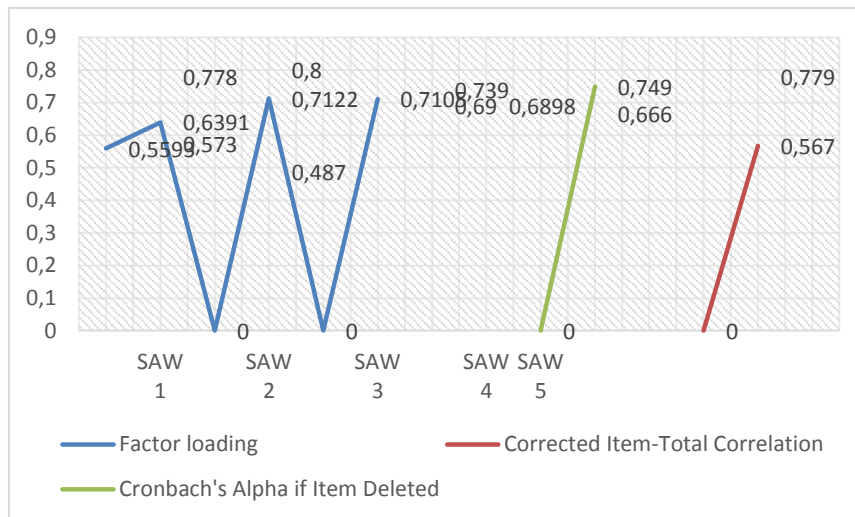


Figure 2: Employee's Actions

## 5. Conclusion and Further Research

The purpose of the study was to examine employee's actions towards health and safety compliance in construction. Measurement variables were considered by the experts to have high impact on employee's actions. IQD was used to reach consensus for the study with varying impacts. The median ranging from (7.00-10.00) was also achieved in reaching consensus. Further Exploratory Factor Analysis (EFA) revealed that five indicator variables were found to be the determinant of H&S compliance in relation to employee's actions. It can be concluded from the findings that employee's actions are very significant in deriving health and safety compliance in the construction industry. Further research will be conducted using large sample to evaluate the validity of the factors among large construction firms.

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