Government Support towards Health and Safety:  
A Multi-Method Approach Analysis

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Abstract: This study aims to carry out a confirmatory factor analysis on government support features among small and medium-sized enterprises (SMEs) contractors in Ghana. Data were obtained from 558 SMEs contractors in Ghana through a structural questionnaire survey. Data collected were analyzed using structural equation modelling (SEM). The results obtained were used to confirm the factorial structure of the constructs. The SEM analysis confirmed that the Rio coefficient and the Cronbach’s alpha coefficient on the internal consistency were over 0.70 criteria for acceptability. The influence of government support features on the health and safety (H&S) compliance was found to be statistically significant, hence strong in predicting H&S compliance among SMEs contractors. This paper makes a significant contribution to supporting government features among SMEs contractors, and more importantly, provides a significant insight into how H&S compliance among SMEs contractors could be improved.

Keywords: Confirmatory factor analysis, compliance, EQS 6.2, government support, structural equation modelling

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1 INTRODUCTION

Majority of the contractors in Ghana are Small and Medium-Sized Enterprises (SMEs) and provide operational flexibility for the larger firms as subcontractors. SMEs contractors have no financial support to purchase equipment and train their employees (Ofori and Toor 2012; International Labour Office 2005). Therefore, the integration of Health and Safety (H&S) policy with the management systems at all levels of construction industries and its effective implementation, regular education and training should be taken into consideration deeply by both the government and the parties involved. A report on the Department of Occupational Safety and Health (2008) shows that SME con-compliant contractors may have an effect on their employees’ behaviors and compliance levels. The general well-being of contractors’ workers is affected by the high rate of accidents at their workplaces. This is plagued with lack of financial resources, expertise and skilled staff which have significant effect on safety regulations compliance (Department of Occupational Safety and Health 2008). It was found that the provision of support by government institutions relating to H&S compliance issues among SMEs contractors were lagging behind. Hence, there is evidence that a fundamental link between theory and measurement is existed, which leads to the confirmation of measures at the first stage of theory testing. It is presumed that the identified government support in literature will be effective in measuring government support for H&S compliance in the context of Ghanaian cultural. The objective of this paper is to carry out a confirmatory factor analysis of government support features for using in H&S compliance study among Ghanaian SMEs contractors.

The paper begins with an overview of a literature review on the topic in question. The adopted methodology for the study is presented, followed by the results of the questionnaire survey and findings of the research. Finally, conclusions are drawn and recommendations are made. The paper makes a significant contribution to government support features among SMEs contractors. In addition, it provides significant insight into how H&S compliance among SMEs contractors could be improved.

2 SMALL AND MEDIUM-SIZED ENTERPRISES AND OCCUPATIONAL HEALTH AND SAFETY

Small and Medium-Sized Enterprises (SMEs) are recognized as the engines of local economy and the major

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source of present and future employment in all countries. In response to the demands for flexibility arising from globalization, many large companies concentrate on a few specialized core areas. Hence, the high numbers of SMEs, micro-enterprises and self-employed workers (International Labour Office 2005) are due to outsourcing and subcontracting. Most SMEs contractors in the developing countries are not adequately covered by safety and health legislation and a large number of SMEs contractors operate in the informal economy beyond any coverage by the formal Occupational Safety and Health (OSH) or inspection services. SMEs contractors are also reluctant to seek advice that is relevant to H&S inspection (International Labour Office 2005). Hence, occupational hazards and risks are recognized to be more widespread in SMEs contractors than in large enterprises. A report on the South African Construction Industry Development Board (2009) shows that the activities done in the construction industry are at high risk due to its poor H&S performance record. This is coupled with various legislative and institutional frameworks, of which the primary objective is the prevention of accidents and their consequences in terms of injury, disablement, fatality and ill health within the workplace. Weil (2001) posited that the number and severity of H&S standard violations provide one measure of the degree to which a contractor’s operations comply with Occupational Safety and Health Act (OSHA) standards. Research has also shown that legislation or targeted regulations can influence H&S performance of either a project, industry or a stakeholder (Construction Industry Development Board 2008). Moreover, construction H&S has become one of the top ten risks (Furter 2011). SMEs contractors have limited resources and technical capacity, and also limited awareness of the existence of occupational safety and health standards, or how to comply with them without undermining business performance (International Labour Office 2005).

Institution of Occupational of Safety and Health (2004) contends that it is insufficient, for example, to provide safe equipment, systems and procedures if the culture is not conducive to a healthy and safe working environment, since culture creates a homogeneous set of assumptions and decision premises in which compliance occurs without surveillance (Grote 2007). It is also argued that a positive culture leads to both improved H&S as well as organisational performance (Dingsdag et al. 2006). Behaviour is a product of culture just as same as accidents that are a product of the prevailing culture (Wiegmann et al. 2002). “Sustained improvement in H&S would not happen without cultural change” (Dingsdag et al. 2006). OSH culture can be described in terms of the informal, cultural aspects of an organization. The latter can have an impact on how OSH is perceived and dealt with, and on whether people are aware of OSH-related issues and act in a safe and healthy way (European Agency for Safety and Health at Work 2011). “OSH culture” - can be seen as the relationship between organisational culture and OSH. OSH culture is about how an organisation’s informal aspects influence OSH in a positive or negative way. This is done at two levels (European Agency for Safety and Health at Work 2011) as below:

1. Setting the values and norms, and underlying beliefs and convictions through which workers would be informed how to deal with or disregard risks;
2. Influencing the conventions for (safe or unsafe, healthy or unhealthy) behaviour, interaction, and communication.

OSH culture can be assessed as part of a process of organizational improvement. It is also perceived and dealt with by workers in an organisation and whether workers are aware of OSH-related issues and act in a safe and healthy way. The knowledge and information, gained from such a cultural approach, can in turn, be very useful in the process of changing OSH-related policies, processes, and practices step by step, adapting them to the existing local context and culture, and eventually lead to better OSH performance (European Agency for Safety and Health at Work 2011).

In order to achieve continuous improvement of workers’ safety and health, a systematic, integrated, proactive, participative, and multiple-strategy approach towards OSH management is needed. Sound OSH management, an organisation’s overall management incorporated into business, and addressing regulatory, technical or engineering, organisational, and managerial aspects, is critical to ensure OSH excellence (European Agency for Safety and Health at Work 2011). Employers, business managers and OSH professionals are striving for excellence in the field of occupational safety and health, the key issue is to ensure that occupational accidents and work related ill health are prevented as much as possible, and as such safe and healthy behaviour amongst all employees is promoted (European Agency for Safety and Health at Work 2011).

Policy formulation, implementation and monitoring are the responsibility of government and are vital indicators to determine H&S compliance for SMEs contractors. However, an organisation’s H&S policy statement details out how it will ensure a healthy and safe work environment. Individual policies need to be developed for specific hazards and issues. Policies should be supported by procedures that provide the step-by-step instructions on how policies will be achieved. Section 2 of Health and Safety at Work (HSW) Act 1974 has indicated that if an organization employs more than five people, it must have a written H&S policy (Health and Safety Executive 2007). The first step that is the management systems approach towards OSH is reflected in the Occupational Safety and Health Convention of 1981 (No. 155). Although the Act deals with OHS and working environment in a comprehensive manner, it is largely a policy rather than a prescriptive instrument. The Occupational Safety and Health Convention of 1981 (No. 155) also provides priority for the formulation, implementation and periodic review of a national policy to prevent accidents and injury arising from and/or is linked with occurrence of accident in the course of work. It also seeks to minimize, as far as possible the
causes of hazards inherent in the working environment (International Labour Office 2005). Moreover, the scope and coverage of OSH provisions has evolved from a focus on industrial safety to one on workplace safety and health, from protection to prevention and assessment of risks. Modern standards are not only reflected in the collective responsibilities of workplace safety and health, but also the respective roles, rights, responsibilities and areas for cooperation between employers, workers and their representatives (International Labour Office 2005).

It is mandatory for the formulation H&S policy by the government to guide the activities of contractors’ in the construction industry. The H&S personnel must be able to provide general H&S advice, and also advice relating to construction H&S issues (Lingard and Rowlinson 2005; Carpenter 2006). Occupational Health and Safety (OHS) is core of the successful long-term sustainability of any business, and fortunately in South Africa, Health and Safety (H&S) is a legislatively compliant criterion enforced by the OHS Act 85 of 1993 and the Department of Labour (Action Training Academy 2014). Health policy is best formulated through rigorous and objective assessment of data. Modern health policy poses complex legal, ethical and social questions. Hence, the goal of health policy is to protect and promote the health of individuals and the community. Government officials can accomplish this objective in ways that respect human right (Gostin 1995). However, official government policy should be legally binding, or at least has persuasive force in law comprising the evaluation of the relevant strengths and weaknesses of each government with respect to health policy formulation. It should also examine sources of information and influence that will help to drive policy making.

3 METHODOLOGY

A quantitative method of data collection was used in the study. A face-to-face method of questionnaire administration was adopted among 558 SMEs contractors in Ghana. Data collected questionnaire were analyzed using structural equation modelling (SEM) software Version 6.2. The SEM software was used to assess the structure factor of the construction. The conceptual variables were then tested as a prior using SEM of the questionnaire survey results.

4 MODEL TESTING

The sample data (558) were finally taken through random sampling before carrying out the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). A total of 269 samples were gathered for the EFA and 289 samples for CFA. CFA using EQS Version 6.2 was used to test the government support features previously (Hu and Bentler 1999). The construct parameters used the maximum likelihood method. Consideration was given to Yuan, Lambert and Fouladi’s coefficient, since psychometric data have a tendency not to be normally distributed. This means that if Yuan, Lambert and Fouladi’s values showed significance deviation from normality, the Satorra-Bentlet scale statistics (robust) would be used as these have been found to perform adequate under such conditions (Bentler 1990). The construct validity for the variables was conducted to demonstrate the extent to which the constructs hypothetically relate to one another in order to establish the score reliability. This also referred to the test of measurement invariance (MI), factorial invariance or measurement equivalence between indicator variables. MI is an important requisite in SEM because it attempts to verify that the factors are measuring the same underlying latent construct within the same condition. MI ensures that the attributes would relate to the same set of observations in the same way. The MI for the government support features was determined based on the examination of the residual covariance matrix from CFA output results as opposed to the correlation matrix. Covariance matrix establishes the variables that adequately measure the government support constructs.

Therefore, EFA was conducted on the government support indicator variables to identify which items appropriately measure the government support features. Identified indicator variables with an unacceptable high residual covariance matrix greater than 2.58 were dropped after the CFA was performed. This implies that the identified indicator variables do not sufficiently measure the government support features regardless of their importance in other cultural contexts and previous studies. Byrne (2013) and Jöreskog and Sörbom (1995) opined that residual covariance matrix greater than 2.58 are considered large. Therefore, in order for a variable to be described as well-fitted in measuring a construct such as government support, the distribution of residual covariance matrix should be systematically centred on zero (Byrne 2013; Jöreskog and Sörbom 1995). This procedure was adopted as a mean to ensure that the indicator variables measured the latent constructs. The assumption of measurement invariance is mostly tested in CFA (Meredith 1993) in order to allow for comparison of indicator variables under the same condition. In the current paper, multi-sample CFA was

Table 1. Government support conceptual variables

<table>
<thead>
<tr>
<th>Latent constructs</th>
<th>Indicator variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government support (GS)</td>
<td>Formulate H&amp;S policy for construction.</td>
</tr>
<tr>
<td></td>
<td>Implementation of H&amp;S policy by government representatives.</td>
</tr>
<tr>
<td></td>
<td>Monitoring of H&amp;S policy implementation by government representatives.</td>
</tr>
<tr>
<td></td>
<td>Provision of H&amp;S policy update by government representatives.</td>
</tr>
<tr>
<td></td>
<td>Provide health and safety training by government representatives.</td>
</tr>
</tbody>
</table>
used for the assessment of measurement invariance across latent variables. This procedure was adopted by several researchers (Aigbavboa and Thwala 2013; Reise et al. 1993).

5 RESULTS

5.1 Descriptive Statistics

Table 2 indicates the government support features in terms of percentage responses on a scale of 1 (strongly disagree) to 5 (strongly agree), and a MS ranging from 1.00 to 5.00. All the MSs are above the midpoint score of 3.00, which indicates that the respondents agreed with the government support features of health and safety compliance. It is notable that all the five ranked government support features have a MS > 3.80 ≤ 5.00, which indicates that the respondents perceive the government support features to be between neutral and agree. The relatively low MS = 3.90 - 3.80 suggests that these variables are not very significant in driving health and safety compliance among SMEs contractors.

5.2 Measurement Model for Government Support (GS)

A total of 558 samples were analyzed and the data showed five (5) indicator variables (GS 1, GS 2, GS 3, GS 4 and GS 5) with acceptable residual covariance matrix, hence CFA was conducted. The assessment of the government support model goodness-of-fit was based on the eight indicator variables. The question of the number of constructs to be used is debatable (Bollen 2014; Hayduk and Glaser 2000). Some scholars (Bollen 2014; Byrne 2013; MacCallum et al. 1996) have suggested a minimum of four indicator variables. Analysis of Yuan, Lambert and Fouladi's values showed that data deviated significantly from normality (Yuan, Lambert and Fouladi = 262.0696), hence the decision about using the robust maximum likelihood method. The examination of the Bentler-Weeks structure representation for the approved construct revealed that GS construct has five (5) dependent variables, six (6) independent variables and ten (10) free parameters. The number of fixed non-zero parameters was six (6). These representations are shown in Figure 1.

![Figure 1. Measurement model of government support](image)

Table 2. Government support features

<table>
<thead>
<tr>
<th>Variables</th>
<th>Strongly disagree</th>
<th>Strongly agree</th>
<th>MS</th>
<th>SD</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulate H&amp;S policy of construction</td>
<td>4.2</td>
<td>5.2</td>
<td>8.4</td>
<td>55.6</td>
<td>26.6</td>
</tr>
<tr>
<td>Monitoring of H&amp;S policy implementation</td>
<td>3.5</td>
<td>7.0</td>
<td>11.5</td>
<td>53.1</td>
<td>24.8</td>
</tr>
<tr>
<td>Implementation of H&amp;S policy by government representatives</td>
<td>4.9</td>
<td>7.3</td>
<td>10.8</td>
<td>52.4</td>
<td>24.5</td>
</tr>
<tr>
<td>Provision of H&amp;S policy update by government representatives</td>
<td>5.2</td>
<td>7.0</td>
<td>12.2</td>
<td>51.0</td>
<td>24.5</td>
</tr>
<tr>
<td>Provision of Health and Safety (H&amp;S) training by government representatives</td>
<td>5.6</td>
<td>8.0</td>
<td>10.1</td>
<td>53.1</td>
<td>23.1</td>
</tr>
</tbody>
</table>

Note: MS – Mean score; SD – Standard deviation

Table 3. Robust fit indexes for safety act and the features construct of working condition

<table>
<thead>
<tr>
<th>Fit index</th>
<th>Cut-off value</th>
<th>Estimate</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S - B\chi^2$</td>
<td>3249.5</td>
<td>1861</td>
<td>Good fit</td>
</tr>
<tr>
<td>df</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFI</td>
<td>0.794</td>
<td>Acceptable</td>
<td></td>
</tr>
<tr>
<td>RMSEA 95%</td>
<td>Less than 0.05 with confidence interval (CI) 0.00-0.05 &quot;good fit&quot;</td>
<td>0.051</td>
<td>Good fit</td>
</tr>
<tr>
<td>NFI</td>
<td>Greater than 0.90 &quot;good fit&quot;</td>
<td>0.629</td>
<td>Acceptable</td>
</tr>
<tr>
<td>NNFI</td>
<td>Greater than 0.80. &quot;good fit&quot;</td>
<td>0.777</td>
<td>Acceptable</td>
</tr>
<tr>
<td>RMSEA 95% CI</td>
<td>0.048: 0.054</td>
<td>Acceptable range</td>
<td></td>
</tr>
</tbody>
</table>
difference between the sample data and the postulated government support features measurement model was significant. Based on these values, the chi-square value was determined to be 1.75. The norm values up to 3.0 or 5.0 are recommended (Kline 2015). The ratio of $S - B \chi^2$ to the degree of freedom was lower than the lower limit value of 3.0, suggesting a good fit for the data.

Table 3 shows the suitability of indexes. The comparative fit index (CFI) of 0.794 was found to be slightly lower than the cut-off value for good fit model. A model is said to be good fit if the CFI is above the cut-off value of 0.95 (Hu and Bentler 1999; Jöreskog and Sörbom 1995). This indicates a drop (difference of 0.156) in the CFI value, hence the model can be described to have an acceptable fit, though not well fitting. However, the robust mean square error of approximation (RMSEA) with 95 per cent confidence interval was found to be 0.051 (lower bound value = 0.054 and the upper bound value =0.048) which is within the acceptable range for a good fit model (MacCallum et al. 1996). Moreover, both the norm fit index (NFI) and non-norm fit index (NNFI) were found to be within the acceptable range of 0.629 and 0.777 respectively. Evaluation of RMSEA (95% CI), CFIs, NFIs and NNFIs indicated an acceptable fit of the measurement model, but not very good for a government support features factor.

5.3 Testing the Direct Influence of Government Support (GS) Features on Overall Health and Safety Compliance

The examination of the Rio coefficient and the Cronbach’s alpha coefficient to establish reliability made the determination of the internal consistency of the GS measurement model possible. Kline (2015) posited that the desired multivariate reliability coefficient should fall between zero and 1.00. The Rio coefficient of internal consistency was found to be 0.964 which was above the minimum value of 0.79. The Cronbach’s alpha was found to be above the minimum value 0.70 at 0.937. High levels of internal consistency and internal reliability can be seen in Table 4.

The examination of the magnitude of the parameter coefficients led to the determination of the construct validity. Hence, high parameter coefficients greater than 0.50 indicate a close relation between the factor and the indicator variable. Hair et al. (1998) posited that a parameter coefficient of 0.50 is interpreted as 25 per cent of the total variance in the indicator variable being explained by the variable (factor). In this case, a parameter coefficient has to be between 0.50 and 0.70 or greater to explain about 50 per cent of the variance in an indicator variable. Hence, the inspection of the standardized parameter coefficient shown in Table 4 illustrates that they were significantly high (values from 0.747 to 0.604). The minimum estimate of 0.604 suggested that the measured factor accounts for 9.540 of the $R^2$-statistics in predicting the overall health and safety (H&S) compliance. The $Z$-statistics for each indicator variables by the endogenous variables revealed that the scores were significant at 5 per cent level.

Moreover, the assessment of the inter-factor correlation ($R^2$) values for the government support feature indicator measures revealed that only two indicator values were close to the desired value of 1.00, therefore not significant in predicting the SME contractors’ H&S compliance. The inter-factor correlation test of statistics (Z-stats) which functions as a $Z$-statistics test shows that the estimate is significantly different from zero. However, the $R^2$ did not significantly measure the $R^2$ variable. The statistical assessment of the score results showed that the influence of this factor on the $R^2$ variable was nominal (indirect). Nevertheless, the combined results revealed that it has a good indirect association in the prediction of the overall H&S compliance.

5.4 Discussion

Findings on the study show that government support indicator variables satisfied internal reliability and the construct validity criteria. The Rio value was above the minimum value of 0.70 (Table 4). The construct validity criteria were justified by the magnitude and statistical significance of all coefficient parameters. The CFA analysis of the government support feature indicator revealed that five indicator variables passed the test and were used for the assessment of the suitability of the government support measurement model. Moreover, the indicator variables were closely associated with the

<table>
<thead>
<tr>
<th>Indicator variable</th>
<th>Stand. coefficient ($\lambda$)</th>
<th>Z - Stat.</th>
<th>$R^2$</th>
<th>Factor loading</th>
<th>Sig. at 5% level</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS 1</td>
<td>0.384</td>
<td>7.733</td>
<td>0.839</td>
<td>0.5335</td>
<td>Yes</td>
</tr>
<tr>
<td>GS 2</td>
<td>0.499</td>
<td>9.565</td>
<td>0.853</td>
<td>0.639</td>
<td>Yes</td>
</tr>
<tr>
<td>GS 3</td>
<td>0.519</td>
<td>9.767</td>
<td>0.751</td>
<td>0.644</td>
<td>Yes</td>
</tr>
<tr>
<td>GS 4</td>
<td>0.539</td>
<td>7.922</td>
<td>0.731</td>
<td>0.6047</td>
<td>Yes</td>
</tr>
<tr>
<td>GS 5</td>
<td>0.631</td>
<td>9.422</td>
<td>0.71</td>
<td>0.5964</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Note: 1. Cronbach’s alpha = 0.937; Rio coefficient = 0.964 (Robust statistical significance at 5% level).
2. SEM analysis norm (Kline 2015) - One variable loading per latent factor is set equal to 1.0 in order to set the metric for that factor.
3. Parameter estimates are based on standardized solutions.
dependent variable. The remaining indicator variables were not influential in predicting the government support feature variables. This was clear in the assessment of SMEs’ overall H&S compliance. Further assessment of the Z-statistics, that accounted for each measure by the indicator variables, revealed that the scores were significant, since all the Z-statistics values were close to 10.00. These results suggest that the direct influence of these variables on the H&S compliance was insignificant (indirect).

The Formulation of H&S policy is under responsibility of the government, and its implementation and monitoring among SMEs contractors by government officials will serve as an important indicator that will determine SMEs contractors’ compliance. Descriptive assessment of government support features revealed that the findings concur with the work of Health and Safety Executive (2007) and Gostin (1995). This indicated that most respondents were in agreement with the fact that government support have a significant influence on H&S compliance.

Conducting a confirmatory factor analysis to confirm the factorial validity of the government support features is vital because of its application in H&S study among SMEs contractors in Ghana. The analysis of confirmatory factor analysis made it possible to characterize and identify specifically the factors of government support which have statistically significant influence on the SMEs contractors in Ghana. Even though, the factors were negligible in predicting the SMEs contractors’ overall H&S compliance. SMEs contractors will implement and monitor the H&S policy formulated by the government to ensure H&S compliance. The preceding facts indicate that the confirmation measures should be the first stage of theory testing.

6 CONCLUSION AND RECOMMENDATIONS

The prior postulated that government support is or are based on a set of variables. The postulated prior was analyzed using EQS version 6.2 SEM software package. The SEM process was undertaken as both EFA and CFA of the prior variables. The CFA analysis revealed that five indicator variables were successful in the factorial validity test conducted. The five indicator variables were used for the assessment of the suitability of the government support measurement model. Further findings indicated that the Z-statistics for the eight indicator variables were within the acceptable range. The robust fit indexes had an acceptable fit, while RMSEA value and the RMSEA with 95 per cent confidence interval produced an acceptable range. Moreover, the parameter estimates were statistically significant and dealt with successfully. Hence, the measurement model for government support features had an adequate fit to the sample data. The CFA result shows that only few variables were classified as predictors of government support in other cultural contexts from the literature review to determine government support among SMEs contractors in Ghana. Other studies that have used different research methods on the determinants of support from the government are in agreement with the above-mentioned view.

Most of the variables that determine government support in other cultural contexts were not considered in Ghana. This research supports the theory of confirmation by which the measurement of indicator variables should be the first stage of theory testing. The authors were of the view that the SEMs technique should be used to further improvement on the variables that may be considered in the development of new H&S projects. The findings offer the minimum requirement that may be used by the Ministry of Water Resources and Works and Housing (MWRWH) to influence H&S compliance among SMEs contractors in Ghana. It is therefore recommended that a checklist of items defining the factors of government support features should be instituted to guide stakeholders in order to meet the basic requirements that will have an influence on H&S compliance.

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