

MODIFIED CONCEPTUALIZED HEALTH AND SAFETY COMPLIANCE MODEL FOR SMALL AND MEDIUM-SIZED CONTRACTORS IN GHANA

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The majority of the construction industries in Ghana are dominated by the Small and Medium Sized (SMEs) contractors. The SMEs inability to manage Occupational Health and Safety (OHS) effectiveness has been the contributing factor to the accident. A review of the literature was conducted for the development of Health and Safety (H&S) compliance model for SMEs contractors in Ghana. The study adopted various constructs from Accident Root Causes Tracing Model (ARCTM) and Domino theory. Both objective and subjective attributes were combined during the assessment. The Domino Theory form the basis for the theoretical and conceptual framework of this paper. The hypothesized H&S compliance model is presented in this paper based on an in-depth review of the previous models. The gaps identified in the literature are government support and contractor's organizational culture. Discussions also included the integrated holistic model and the variables of the model, identification of the model and justification for the selected variables. The identified gaps serve as variable constructs in H&S compliance research. The theorized conceptual model is a multidimensional structure composed of six latent constructs.

Keywords: Challenges, Justification, Measurement, Selection, Specifications, Variables.

1 INTRODUCTION

Small and Medium-Sized Enterprise (SMEs) contractors form bulk of the constrictors' in Ghana (Ofori and Toor 2012; Frempong and Essegbey 2006; Laryea 2010; Kheni *et al.* 2007; Ghana Health Service, GHS, 2007). This limitation prevents the implementation of H&S standards on construction sites. Improving Occupational Health and Safety (OHS) has always been a concern for intensive actions to be taken. The prevalence of OHS challenges in Ghana might also be attributed to limited financial resources and attention given to OHS. Kheni and Braimah (2014) asserted that the attitudes of construction companies towards H&S in Ghana have been affected by institutional structure responsible for H&S implementing standards at workplaces. Kheni and Braimah (2014) cited the following as the major problems: poor coordination of the activities of the many institutions responsible for implementing H&S standards, lack of specific H&S regulation and undesirable level of compliance with relevant H&S legislation. It was further reported that for OHS to be implemented, it is necessary for construction companies to have a positive change in their attitudes. The implementation of OHS will be achieved by re-structuring of the OHS administration system in Ghana (Kheni and Braimah 2014). Various attempts by previous research works to substantiate the relationship between compliance with H&S seem elusive. The issue of H&S compliance in the construction industry is important because of the

high rate of accidents. This study attempts to develop H&S compliance model for SMEs contractors' in Ghana to assist in accident minimization. The discussions of the H&S model for SME's contractors are based on the selection of the variables for H&S compliance model. The conceptual model latent features, specification and justification of the models and structural component of the model were discussed. This is followed by H&S compliance model and measurement component of the model.

2 SELECTION OF VARIABLES FOR HEALTH AND SAFETY COMPLIANCE

This section provides details on the selection of variables for Health and Safety (H&S) compliance model. The International Labor Organization (ILO) (in National Occupational Health and Safety Policy of South Africa (2003) indicated that safe work creates no obstacles to being competitive and successful. Health and safety in the workplace is about preventing work-related injury and disease, and designing an environment that promotes well-being for everyone at work (Safe work Australia 2013; Heinrich *et al.* 1980). The recklessness and undesirable traits leading to accident can be prevented when employers ensure the safety of employees at work environment. Jamal Khan (in Mat Zin and Ismail 2012) opined that ignorant behavior and attitude of employers and employees contribute to rise of issue on behavioral safety non-compliance to requirements of Occupational Safety and Health Act (OSHA) 1994". "Most of the accident causation theories addressed the human (worker) as the main problem that makes an accident happen such as permanent characteristic of human, the combination of extreme environment and overload of human capability and conditions that make human tends to make mistake" (Abdelhamid and Everett, 2000). Safety behavior or acts can be achieved through the following processes: working with safety devices such as personal protective equipment, use of equipment that are in good condition, follow the correct work procedure at any time work is to be carried out, employees should have good knowledge level of work and they should also obey work procedures whenever they are carrying out any activity. Smallwood (2010) identified workers attitude as one of the factors leading to unsafe act of a worker. Workers safety behavior will contribute to safety practices therefore. The worker conducts safe act under the condition that he has undergone safety training and been provided with health and safety equipment to protect him from any harm. Hosseinian and Torghabeh (2012), Fang, Choudhry and Hinze, (2006) and Abdul Hamid, Yusuf and Singh (2003) are of the view that a worker must perform safe acts and this should be in relation to safety standards, by working with protective equipment and when they have enough rest before the day's work to prevent any accident occurring. The resultant of unsafe acts or unsafe condition is accident (Heinrich *et al.* 1980). It is therefore mandatory for employers to provide their employees with safe working conditions to enable them abide by health and safety regulations.

Therefore, the Health and Safety (H&S) compliance study models for the assessment of H&S compliance was made up of objective and subjective attributes. The Domino Theory by Heinrich and that of Adams had similar concept, but the elements were different (Heinrich *et al.* 1980). Weaver had similar concepts of elements or factors as Henrich's (Heinrich *et al.* 1980). Petersen's model developed in the 1971 had different concept with the Domino Theory of 1959 which had influence on many researchers during Heinrich's time. It is believed that the contributing factors, causes, and sub-causes are the main culprits in an accident scenario as inspired by the model (Abdelhamid and Everett 2000). Behavior model, human factor model, and Ferrel theory relate to human error theory (Hosseinian and Torghabeh 2012; Hughes and Ferrett, 2007; Taylor, Easter, and Hegney 2004; Abdul Hamid, Yusif, and Singh 2003). Most of these theories address the human (worker) as the main problem that makes an accident happen

(Abdelhamid and Everett 2000). Abdelhamid and Everett (2000) indicated that there is every tendency of humans to make error under various conditions and situations, but finally, the blame will fall on human most often (unsafe). Many important rules of Accident Root Causes Tracing Model (ARCTM) have been derived from the effort of Heinrich in the year 1959. ARCTM insist on specific issues such as worker training, worker attitude and management procedure problems should be recognized and modified to avoid reoccurrence of accident. Research conducted by Abdelhamid and Everett (2000) in identifying root causes of construction accidents concluded that the application of ARCTM should serve as a complement to accident investigation process and should be able to give solutions to accident occurrence and preventive measures in the industry. The three constructs proposed by ARCTM to the two construct from Heinrich are supported and adopted for the current study. But both models have one construct in common. This study considers the H&S compliance bundle in a typical construction industry to contain SE with 6 variables; SAW with 20 variables; SWC with 7 variables; RWSC with 5 variables. Almost all the H&S compliance studies have these constructs conceptualized on frequent basis. However, the current study brings into focus GS with five variables and COC with 11 variables each. The two additional constructs are the identified gaps in the literature and were found to be peculiar to Ghana as a developing country.

3 DESIGN/METHODOLOGY

The assessment of H&S compliance model for the study was carried out through the combination of objective and subjective attributes. The Domino Theory form the basis for theoretical and conceptual framework of this paper. The study adopted various constructs from ARCTM and Domino theory. The selection of the variables were based on the theoretical framework built from literature review. Based on the fundamental underpinning of two models, and the incorporated theoretical perspectives, which has been adopted in other similar studies. The model to be conceptualized within the broad theoretical framework is based on the approach used by Heinrich and ARCTM. The model or conceptual framework model for the paper looks at the safe environment (SE), safe acts of worker (SAW), safe work condition (SWC) and reaction of worker to safe condition (RWSC). Government support (GS) and contractor's organizational culture (COC) as the identified gaps will in turn predict the construction industry health and safety compliance. The structural components of the model are: SE, SAW, SWC, RWSC, GS and COC. The measurement component of the hypothesized model comprises of the following health and safety compliance (HSC) factors: SE = 8 measurement variables; SAW = 17 measurement variables; SWC = 17 measurement variables; RWSC = 8 measurement variables; GS = 5 measurement variables; COC= 11 measurement variables and HSC = 7 measurement manifest variables.

4 MODEL SPECIFICATION AND JUSTIFICATION

The theoretical conceptual framework for this paper was built on the work of Heinrich *et al.* (1980) and ARCTM which was also built on the previous accident models. Heinrich *et al.* (1980) conceptualized that ancestry and social environment, fault of a person, unsafe acts and condition lead to accident. Because the cause of accident is people and management handles the prevention of accident. The reason being that majority of accidents are due to human error and the accident can only be prevented if management provides conducive environment for the employees to work. Adams shared similar view with Heinrich. Adams emphases was on management organizational structure and reflect the relationship involved with the causes and effects of all incidents and accidents which has management involvement directly (Heinrich *et al.* 1980). Five

elements were stated in both Heinrich and Adams and have similar concept, but the elements were different (Heinrich *et al.* 1980). The role of management in accident prevention was also emphasized in a broader sense taking into consideration the root of unsafe acts or conditions (Heinrich *et al.* 1980). ARCTM conceptualized that unsafe condition, reaction of worker to unsafe condition and unsafe acts of worker lead to accident. The non-compliance level of H&S in the construction industry are related to the environment, unsafe acts, unsafe condition, reaction of worker to unsafe condition and unsafe acts of worker. Both Heinrich and Peterson, as well as ARCTM, emphasized on unsafe acts and unsafe condition as the main causes of accident in the construction industry. The two basic components of the model are: safe acts and safe condition. Based on the fundamental underpinning of two models, and the incorporated theoretical perspectives, which has been adopted in other similar studies, they are therefore useful for conceptualizing the present study as a variety of health and safety studies and health and safety compliance being conceptualized within the broad theoretical framework.

Therefore, the conceptual framework for this paper is primarily based on the approach used by Heinrich and ARCTM. Based on the fundamental factors and constructs associated with all the previous models in my research. The present model or conceptual framework model for the study looks at the safe work environment, safe acts, safe condition, reaction of worker to safe condition and safe acts of worker. These factors have been measured in a majority of the previous studies, but consideration has not been given to government support and contractor's organizational culture; which have been classified as the exogenous variables and their role in predicting overall health and safety compliance, which is the endogenous variable. These will in turn, predict the construction industry health and safety compliance. The reason for combining both objective and subjective indicators within the proposed model is supported by Campbell *et al.* (1976) and Falah *et al.* (1995) who stated that: by themselves, objective indicators are often misleading and will remain so until indicators that human beings attached to them, are obtained. Likewise, by themselves, subjective indicators are insufficient as guides to policy. The conceptual model theorizes that health and safety compliance is established by the relationship that exists between the exogenous variables, which include the basic elements by which the subjective and objective measurements are linked. These variables identified from the review of literature are considered the major determinants of H&S compliance. The determinants identified have been adopted to fit with the H&S compliance in the Ghanaian construction industry.

5 STRUCTURAL COMPONENT OF THE MODEL

The integrated health and safety (H&S) compliance model for the Ghanaian construction industry in the case of developing countries, is derived from safe work environment (SE), safe acts of Workers (SAW), safe work condition (SWC), reaction of worker to safe condition (RWSC), government support (GS) and contractor's organizational culture (COC) in the process of achieving safety in the construction industry. The theoretical underpinning of this priori is derived from the works of Heinrich *et al.* (1980) and ARCTM. Most of the important rules of ARCTM was derived from the efforts of Heinrich, Peterson, Bird, Ferrell and Peterson (Hosseinian and Torghabeh 2012); Jha (2011); Fang, Choudhry and Hinze (2006) as discussed in chapter 3 of my research. The conceptualized model is the notion that compliance of health and safety is related to the evaluation of many variables, such as SE, SAW, SWC, RWSC, GS and COC. It is difficult to discuss the principal variable without reference to variables of government support and contractor's organizational culture and inclusion of the other exogenous variables. The evaluation will depend on the compliance assessment of several indicator variables under each of the exogenous variables. In this study, the objective evaluation of health and safety

compliance will be assessed by measuring the actual condition of the construction industry that is an exogenous variable in the model as shown in Figure 1.

5.1 Measurement Component of the Theoretical Model

The measurement component of the hypothesized model comprises of the following health and safety compliance factors: SE = 8 measurement variables; SAW = 17 measurement variables; SWC = 17 measurement variables; RWSC = 8 measurement variables; GS = 5 measurement variables; COC= 11 measurement variables and HSC = 7 measurement manifest variables. The success for the consideration of health and safety compliance for the benefit of the construction industry has been theorized in the present model. The health and safety compliance (HSC) model has seven measurement manifested variables as shown in Figure 1.

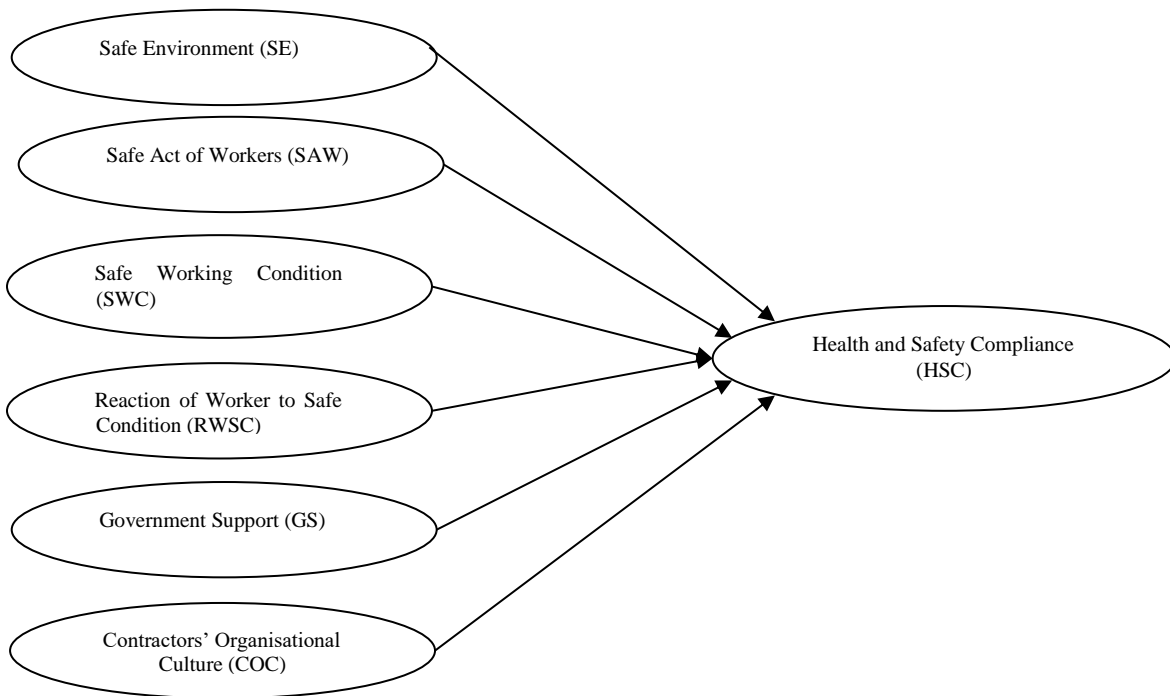


Figure 1. Conceptualized mode for health and safety (H&S) compliance.

6 DISCUSSION OF RESULTS

The main problem that leads to accidents on construction sites as posited by Abdelhamid and Everett (2000) and in most theories were the workers. Worker training, worker attitude and management procedure problems were emphasized as the means of minimizing the reoccurrence of accidents on sites. These findings concur with the findings of Abdelhamid and Everett (2000). However, the H&S compliance study models used for the conceptualization of the H&S compliance model in Ghana was based on Domino Theory by Heinrich and Adams which had similar concept. Three constructs proposed by ARCTM to two construct proposed by Heinrich *et al.* (1980) were adopted in addition to the two gaps identified.

7 CONCLUSION AND FURTHER STUDIES

The theorized conceptual HSC model for SMEs contractors in Ghana is composed of six latent constructs. Further studies should be conducted among large contractors in Ghana to validate the developed conceptual model.

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