

Factors Affecting Occupational Safety and Health Compliance on Construction Sites in Kiambu County, Kenya

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Abstract:- The construction sites remain the most fatal sites globally due to the fact that compliance of occupational safety and health standards on the construction sites remains questionable. Despite the efforts made by DOSH to ensure that OSH compliance on construction sites is achieved, still stakeholder engagement and use of appropriate technology to ensure compliance is a great challenge. Most of the accident, hazardous occurrences, injuries and fatalities are on a sharp rise due to lack of strict adherence to occupational safety and health compliance on construction sites. The purpose of this study was to investigate the factors affecting occupational safety and health compliance of the construction sites in Kiambu County, Kenya. This study was grounded on the Stakeholder Theory that clearly guided the researcher to understand the interrelations between the intrinsic and extrinsic factors affecting compliance on construction sites. A cross sectional descriptive study was carried out in the randomly selected construction sites in Kiambu County. The researcher used questionnaires for collection of qualitative and quantitative data from contractors and workers on the construction sites. The data collected and descriptive and regression analysis were used. The study concludes that stakeholder engagement and use of technology affected the OSH compliance on the construction sites. The study further revealed that use of appropriate technology and engaging the stakeholders in the right manner on the construction sites greatly attributes to OSH compliance on the construction sites.

Key words: *Stakeholder engagement, Technology, Occupational Safety and Health, Compliance*

1.1 INTRODUCTION

Occupational Safety and Health remains a chief concern for humanity in the World. Human beings risk exposure to irritants like chemicals, risk of injuries through running conveyer belts, falling objects, injurious exposure to radiant, exposure to dangerous gases, slippery floors and any other injurious incident. It is prudent for an employer to provide safe working environment free from any form of dangers (Abaya & Ondieki, 2021).

Mwangi (2016) Connotes that the construction industry has a disproportionately high percentage of injuries and fatalities, accounting for almost 20% of the fatalities of all industrial workers but employing only 6-8% of the industrial work force. It is important to acknowledge the fact that the construction industry accounts for nearly 15 % of the workers compensation injuries.

A study Kirombo (2012) revealed that, OSH compliance of the construction sites is an issue that ought to involve different types of stakeholders. These stakeholders include: Engineers, Architects, safety officers, contractors, drivers, and the government agencies. The Kenya Association of Building and Civil Engineering Contractors which is a body bringing together registered member building contractors should make the cue for its members to embrace health and safety matters by providing the relevant training and induction programs. Members could also be encouraged to seek ISO certification such as OHSAS – 18001, which is an Occupational Health and Safety Assessment series for health and management systems intended to help organizations control occupational health and safety risks in the work place. Another is ISO 9001:2008 Standard, which is a 3rd Party Certification on Quality Assurance through effective policies, practices and procedures and bench marking with best practice elsewhere. Making the 3rd Party Certification mandatory for registration as a contractor will give a positive boost to implementation of occupational safety and health in the construction industry (Kirombo, 2012).

Globally, Occupational injuries, illness and even deaths are serious public health concerns. Everyone must work to earn a living. All of us must also work for economic development of our countries. This means that people spend most of their lifetimes working and in their work places, some five and others six days in a week. The work environment is therefore very important as it is the commonest setting in which occupational injuries, illness and even deaths occur. Yet, studies have shown that more

than 90% of these injuries are preventable by the adoption of safety measures, appropriate and consistent use of PPE (Chepkener, 2013)

2.1 General Objective

The overall objective of this study was to investigate the factors affecting occupational safety and health compliance on construction sites in Kiambu County, Kenya.

3.1 Literature review

This paper reviewed the related literature concerning the factors predominantly affecting the OSH compliance on construction sites in Kiambu County. The study further reviewed out relevant studies regarding stakeholder engagement and how technology affects the OSH compliance on the construction sites.

3.1.1 Stakeholder engagement and OSH compliance

According to Abdallah (2017), thought that even though, minor decisions and emergency situations are generally not appropriate for stakeholder participation, a complex situation with far-reaching impacts warrant stakeholder involvement and when done proactively, rather than in response to a problem, helps to avoid problems in the future (Maina, 2013). The focus of public participation is usually to share information with, and gather input from, members of the public who may have an interest in a project. The Constitution of Kenya 2010 gives citizen the right to take part in activities that have a direct bearing on their lives (Mbaabu, 2012). In the context of development, community participation refers to an active process whereby beneficiaries influence the direction and execution of development projects rather than merely receive a share of project benefits. Stakeholders' involvement is paramount in development projects. Becerik, (2007) extrapolates that if the project meets practical performance and achieves high level of contentment among key players and various stakeholders, and then the project is considered as overall success.

Lack of stakeholder involvement frustrates the overall implementation process and affects OSH compliance (Ondieki, 2016). In furtherance to related studies based on stakeholder engagement by Osedo (2017), Results showed that the majority (26%) of the respondents enjoyed a very good relationship with project stakeholders. 18% of the respondents indicated that they had a good relationship with project stakeholders. 24% of the respondents indicated that they had a relatively good relationship with project stakeholders. 20% of the respondents indicated that they had a bad relationship with the project stakeholders while 12% of the respondents indicated that they had a very bad relationship with project stakeholders. The study results showed organizations still need to work on improving the stakeholder relationship. He further concluded that stakeholders' engagement is a crucial aspect in project implementation interventions. Nyaguthii and Oyugi (2013) had established that participation of

stakeholders in project implementation influenced success of the project's implementation process. The challenges stated by the study are imperfect project design, poor stakeholder management, delays between project identification and start-up, delays during project implementation, cost overruns, coordination failures, and poor OSH compliance levels.

In addition, to overcome the risk associated with non-involvement of stakeholders on OSH compliance during the implementation process, the public infrastructure project should have a mechanism in place that ensures that a participatory planning process is in place and involves all those that the project affects directly and indirectly. Perceived non-involvement of stakeholders creates anxiety among the stakeholders and especially those directly affected by the project and may lead to total rejection of the project. It will be of high importance to involve the stakeholders early in the project stages to ensure that they own and defend the project (Onyango, 2017).

Chen (2005), connotes in relation to stakeholders' engagement that, identifying stakeholders and their interests should be among the first, if not the very first, of the items on agenda involve stakeholders in a participatory process, the reasons are obvious. They should be part of every phase of the work, so that they can both contribute and take ownership. Their knowledge of the community and understanding of its needs can prove invaluable in helping you to avoid mistakes in your approach and in the people, you choose to involve, stakeholders should be included in any assessment and pre-planning activities as well as planning and implementation (Abuga, 2012). If you want your process to be regarded as transparent, stakeholder involvement from the beginning is absolutely necessary (Gray & Larson, 2000). The community will only believe in an open process. If the project involves changes that will affect people in different ways, it's important that they be involved early so that any concerns or barriers show up early and can be addressed. In situations where there are legal implications, such as the building of a development e.g. development of infrastructure like classrooms, laboratories dormitories, dining halls, involving stakeholders from the beginning is both fair and can help stave off the possibility of lawsuits down the road towards project implementation. To enhance community and organization stakeholder's participation or involvement in tendering and supplies, several measures are put in place to facilitate smooth and transparent implementation of projects. These measures include: registration of contractors/suppliers and artisans, provision of information on tendering and supplies guidelines, and formation of a subcommittee for vetting and recommending suppliers (Achoka, 2013: cited in Byegon, 2015).

3.1.2 Use of technology and OSH compliance

Technology serves as a cornerstone to effective Occupational safety and health of projects. Ondieki (2016)

points out that utilizing the available technology and adopting new technology to monitor any danger at the work place serves a stepping stone towards compliance. Ondieki further alludes that the use of automatic emergency reporting signals serves as an informer of any accidents thus prompting to speed evacuation. Installing such automated systems will greatly promote OSH compliance at the work place.

A study by Mwangi (2016) revealed that 51% of the accidents happen at the workplace due to lack of adherence to compliance of the set regulations. Avoiding safety instruction related to use of an equipment or machine which is newly installed is a calamity in awaiting. Proper care and adherence to the compliance regulation on construction sites is key towards reducing accidents (Lango, 2015).

While operating any machine protective gears a must. Most of the conveyer belts, moving parts of a machine ought to be oiled, alarms ought to be installed in order to warn the relevant persons of any potential danger.

3.2 Theoretical framework

This research is theoretically grounded on the Stakeholder Theory. This model is ideal since they support the influence of the independent variables on the dependent variable under study.

3.2.1 Stakeholder Theory

Stakeholder theory states that organizations have relationships with many constituent groups and they can engender and maintain the support of these groups by considering and balancing their relevant interests (Kirsi, 2010). Kirsi (2010) asserted four premises of the stakeholder theory that; corporations have relationships with many constituent groups (stakeholders) that affect or are affected by its decisions, the theory is also concerned with the nature of these relationships in terms of both processes and outcomes for the firm and its stakeholders, that the interests of all (legitimate) stakeholders have intrinsic value and not one set of interests is assumed to dominate others, and finally the theory focuses on managerial decision making. Based on the argument of instrument of power of this theory, a company using stakeholder approach will have increased organizational performance in terms of economics and other criteria (Hasan & Kamil, 2010).

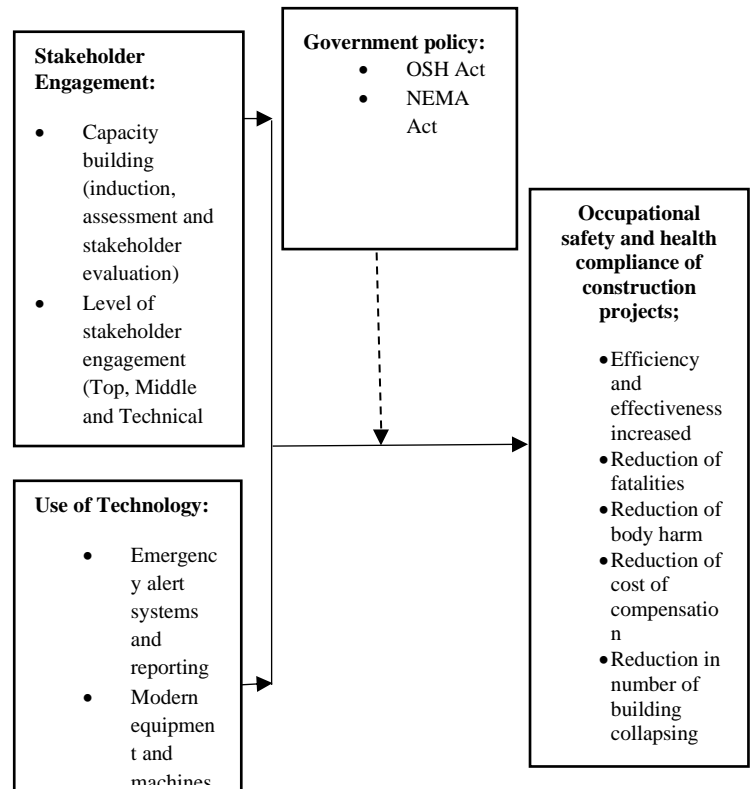
After Lynda (2006) examining stakeholder theory they concluded that the support of key stakeholders was essential for Implementation and project success. This indicates that project managers should on the one hand manage the corporation for the benefit of its stakeholders in order to ensure their rights and participation in decision making and on the other hand the management must act as the stockholder's agent to ensure the survival of the firm to safeguard the long term stakes of each project team member (Musyoka, 2014).

On the construction site, stakeholders should be actively be involved. Failure to involve the stakeholders will result to demotivation hence leading to disowning the particular project. In nutshell, the stakeholder theory posits on the premise of stakeholder engagement at any level of engagement whether top level, middle level or technical level. The more the engagement of stakeholders the great the OSH compliance on construction sites.

3.3 Conceptual Framework

Independent variable
Dependent variable

Moderating Variable



Source: Researcher (2021)

Figure 1 : Conceptual framework showing the inter-relationship between the variables

4.1 Research Methodology

This study adopts the descriptive research design methodology. This research design offered the researcher the opportunity to establish the relationship between independent variables and dependent variable. According to Mugenda and Mugenda (2012) this design is economical and allows collection of quantitative data from a sizeable population.

The researchers adopted simple random sampling method to arrive at a sample size of 30 respondent who took part in the study. The respondents included the construction workers and contractors on the selected active construction sites in Kiambu County. Data was collected using the questionnaire tool.

4.2 Data Collection method

Data was collected by use of a self-administered structure questionnaire. The questionnaire was developed based on review of studies related to occupational health and safety. The questionnaire contained open ended, closed ended questions and Likert scales. Open ended questions allowed the respondent to answer the questions in any way they chose while closed ended questions asked the respondents to make choices among a set of alternatives given by the researcher (Kothari, 2006; cited in Abaya & Ondieki, 2021). Whereas the Likert were used to rate the contractors' and workers' opinions, perception, feelings and attitudes (Mugenda & Mugenda 2012).

5.1 Result

5.1.1 Background of the Respondents

Gender	Frequency	Percent
Male	17	56.7
Female	13	43.3
Total	30	100.0
Age		
Below 20 Years	5	16.7
20-30 Years	5	16.7
30-40 Years	12	40.0
40-50 Years	4	13.3
Over 50 Years	4	13.3
Total	30	100.0
Education Level		
Primary	2	6.7
Secondary	9	30
Tertiary	13	43.3
University	6	20.0
Total	30	100.0

Table 1 Characteristics of the Respondents

Table 1 shows the gender, age and education level of the respondents who participated in the study. Out of the 30 actual respondents, 17 (56.7%) were males while 13(43.3%) were females, a disparity that could primarily be a reflection of the normal gender disparity in the country coupled with the fact that construction industries are male dominated due to the nature of work involved.

Distribution with regards to age brackets, a large proportion of the respondents were aged below 40 years of age. This is a true reflection of the age when on works at their full capacity where the majority of the respondents were between the age of 30-40 years holding 12(40%) whereas the least was over 50 years of age with 4(13.3%).

With regard to the distribution in terms of educational level the study revealed that, 93.3% of the respondents had secondary, tertiary and university qualifications. This indicates that most of the respondents who took part in the study had relevant professional expertise.

5.1.2 Descriptive analysis

The study sought to find out whether stakeholder engagement on occupational safety and health issues

affected compliance for the construction sites. This section provides an explanation of the descriptive statistics on the study variables. To a greater end the study provides a descriptive analysis of the respondents' views on the overall issue of stakeholder engagement on OSH compliance on the basis of variables in the study: Extent to which stakeholders capacity building affects occupational safety and health compliance on construction sites; Extent to which level of stakeholder engagement affect occupational safety and health compliance on construction sites. In addition, it also assessed the extent to which use of technology affect the OSH compliance on construction sites. Furthermore, it assessed the effect of emergency report systems; use of modern equipment and machines and their effects on OSH compliance.

5.1.2.1 Descriptive Analysis for Independent Variables

Opinions were sought on the factors Affecting Occupational Safety and Health compliance of the construction projects in Kiambu County. Findings showed Kiambu County to be more specifically on the active construction sites, workers in those construction sites still stand at a risk of fatalities due to poor implementation of OSH regulations. However, over 90 percent of the respondent concurred that OSH based training on matters of safety in handling machines, equipment, running conveyor belts, risk of falling objects, explosion of chemicals, exposer to dust and high vibrating sounds and health at the workplace is very vital.

This study concurred with the study which was carried by Kirombo (2012) which established that safety induction and assessment for the stakeholders and the general public spells out the rules and provides information on potential hazards and how to avoid them. It is part of a preventive program done through: Induction course; Transfer to new job or change in working methods; capacity building, refresher course and training should be provided to deal with aspects of health and safety to employees (Makori et al., 2012). In addition, Kirombo, further established Training and inductions in construction site workplace helps inculcate in employees a positive health and safety culture. Preventive training and induction procedures in the workplace environment are important tools in preventing accidents at work. All new employees should receive a full induction as soon as possible after starting a new site so that they are made aware of potential hazards and given instruction on how to avoid the possible risks. Mwaruta (2013) provided that, construction sites pose a large variety of risks, making the possibility of an accident quite high due to, changes in job responsibilities, the introduction of new technology, new work equipment, introduction of a new system of work, or even the employment of more vulnerable persons such as young and disabled. Working with dangerous equipment, working around hazardous and unstable materials or simply putting your body through demanding work and strain could lead to a construction accident. (Hughes & Ferret 2008)

The findings based on the effect of stakeholder engagement on safety issues and OSH compliance as well as the use of technology and OSH compliance revealed that those two factors influence OSH compliance on the construction sites to a greater extent as it was rated by the respondents who participated in this study as described in the table 2 below.

Table: 2 Descriptive Statistics on factors affecting OSH compliance

Areas	Not At All	Small Extent	Moderate Extent	Large Extent	Very Large Extent
Extent to which stakeholder engagement affect occupational safety and health compliance on the construction sites	10.0% 3	10.0% 3	13.3% 4	46.7% 14	20.0% 6
Extent to which use of technology affect occupational safety and health compliance on the construction sites	6.7% 2	6.7% 2	13.3% 4	20.0% 6	53.3% 16

The results showed that 90.0% of the respondents agreed that stakeholder engagement affect occupational safety and health compliance on the construction sites whereas, 10.0% of the respondents concurred that stakeholder engagement affected occupational safety and health compliance on the construction site is not evident at all.

On the variable whether the use of technology affect occupational safety and health compliance on the construction sites, the study revealed that 53.3% of the respondent rated it as 'very large extent', 'Large extent' (20.0%), 'Moderate Extent' (13.3%), 'Small Extent' (6.7%) and 6.7% of the respondents gave a 'Not at All' extent. Therefore, findings of this study hold that both stakeholder engagement and use of technology affect OSH compliance on construction sites over 93%. Therefore, the findings reveal that the factors (stakeholder engagement and use of technology) affects Occupational Safety and Health compliance on construction sites.

5.1. 3 Regression analysis

5.1.3.1 Regression analysis on stakeholder engagement and OSH compliance on construction sites

Simple linear regression was adopted to determine the extent to which stakeholder engagement affect the OSH compliance on the construction sites in Kiambu County. It was of a paramount importance to use simple regression model to establish how the views of the participants on how stakeholder engagement as a predictor significantly and insignificantly affect OSH compliance on the construction sites as shown in the summary model table below.

Table 3 Regression model summary of stakeholder engagement and OSH compliance on construction sites

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	0.111 ^a	0.012	-0.023	0.82297

a. Predictor: (Constant), **Stakeholder engagement**

The summary of the table suggests a positive correlation (R=0.111) between stakeholder engagement and OSH compliance as predicted by the regression model. In addition, there is a least variation of 1.2% in the OSH compliance on construction sites as shown by stakeholder engagement results.

Table 4 An ANOVA of Regression of stakeholder engagement and OSH compliance on construction sites

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	0.236	1	0.236	0.349	0.560 ^b
1	Residual	18.964	28	0.677		
	Total	19.200	29			

a. Dependent Variable: (Constant), **OSH compliance on construction sites**

b. Predictor: (Constant), **Stakeholder engagement**

The study sought to establish if the regression model is best fit for predicting OSH compliance on construction sites after use of stakeholder engagement results. The ANOVA results indicated that F-statistics=0.349 is significant at P value 0.560>0.05 implying the predictor coefficient is greater than 0.05 and hence the regression model result is significant for better prediction of stakeholder engagement affecting OSH compliance on construction sites as clearly shown in the regression ANOVA output result on table 4 above.

Table 5 Coefficient for the Regression of stakeholder engagement and OSH compliance on construction sites

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	3.420	0.339		10.084	.000
1	The extent to which stakeholder engagement affect OSH compliance	0.074	0.125	0.111	0.590	0.560

a. Dependent Variable: (Constant), **OSH compliance on construction sites**

This study sought to establish whether stakeholder engagement affected the OSH compliance on construction site. The simple linear regression coefficients result indicated that there was a significant effect of stakeholder engagement on OSH compliance on the construction sites. The coefficient of the stakeholder engagement ($\beta_1=0.074$;

$P < 0.05$) which was greater than 0.05 was statistically significant. It was therefore concluded that stakeholder engagement and OSH compliance on construction sites were positively related.

5.1.3.2 Regression analysis on Use of Technology and OSH compliance on construction sites

Respondents who participated in an interview gave their views and rating of use of technology on OSH compliance for the Construction sites. The preceding tables disclose the results of the regression summaries, ANOVA and Coefficient results.

Table 6 Regression model summary of stakeholder engagement and OSH compliance on construction sites

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	0.108 ^a	0.012	-0.024	0.82325

a. Predictor: (Constant), **use of technology**

The summary of the table suggests a positive correlation ($R=0.108$) between use of technology and OSH compliance as predicted by the regression model. In addition, there is a least variation of 1.2% in the OSH compliance on construction sites as shown by use of technology results. It further revealed that emergency alert systems, and effective use of modern equipment and machines greatly attributed to increased of OSH compliance levels.

Table 7 An ANOVA of Regression of stakeholder engagement and OSH compliance on construction sites

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	0.223	1	0.223	0.329	0.571 ^b
	Residual	18.977	28	0.678		
	Total	19.200	29			

a. Dependent Variable: (Constant), **OSH compliance on construction sites**

b. Predictor: (Constant), **use of technology**

The study sought to establish if the regression model is best fit for predicting OSH compliance on construction sites after use of stakeholder engagement results. The ANOVA results indicated that $F\text{-statistics}=0.329$ is significant at $P\text{ value }0.571 > 0.05$ implying the predictor coefficient is greater than 0.05 and hence the regression model result is significant for better prediction of use of technology affecting OSH compliance on construction sites as clearly shown in the regression ANOVA output result on table 7 above.

5.2 Conclusions

Stakeholder capacity building and their level of engagement an important aspect in ensuring compliance of occupational health and safety measures given the fact that training imparts information and instruction about work thus ensuring that persons engaged to undertake a

particular task have a basic knowledge of preventive measures needed to address possible hazards. The study indicates that the category of workers most affected by accidents in construction sites are the unskilled labourers which confirms the fact that most accidents are a result of low skill and competence, tiredness, boredom, low morale and individual medical problems among other personal factors. Training and inductions in construction sites should therefore target this work category in order to reduce errors and mistakes by providing relevant information, instruction and training so as to improve the implementation of health and safety measures in the construction industry. Result also attest to the fact that increased OSH awareness through stakeholder capacity building, assessment, training and inductions will help reduce the levels of accidents in construction sites thus achieving compliance.


Use of appropriate technology and use of efficient emergency systems, adopting modern equipment and machines will be great attribute to OSH compliance. Safety related training not only reduces fatality and accidents but also builds employees' confidence, boosts the employees' morale, results to gaining of skills to deal with emergency situations, conduct basic firefighting techniques, knowing danger zones and managing stress at the workplace. Induction also increases employee competence thus promoting performance and occupational safety and health compliance.

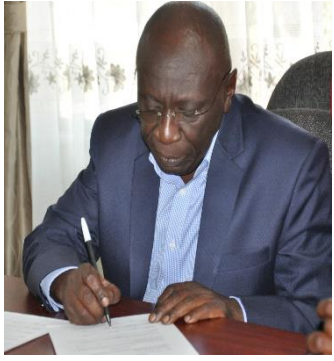
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