

Construction Health and Safety Management and its Influence on Project Success in Nairobi County

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Abstract: *The continuous demand for improved and efficient health and safety management have put pressure to construction project managers, thereby creating a lot of management challenges that require an integrated process to be tackled. Hence, this research sought to assess the impact of health and safety management on construction projects success in Nairobi County. A survey to investigate health and safety management factors was delimited to 45 on-going commercial/ mixed urban development projects each worth more than Kshs100 million in Westlands constituency, Nairobi County. Owing to the fact that the population was reasonably small, a census was deemed suitable for this study. The survey achieved 80% rate of return of questionnaires from the construction project managers and data analysis was carried out using both descriptive and inferential (through correlation analysis) statistical methods. Results from the study were presented in form of tables and figures in a comprehensive manner. The findings indicated that, there is no well-defined site management system in the Kenyan construction industry and most sites are run through intuition and processes that involves a lot of paper work (checklists). This study therefore, recommends use of Oracle prime Projects Cloud Service, radio frequency identification device (RFID) technology, drones and Autodesk Navisworks software in construction health and safety management.*

Keywords: *Construction Health and Safety Management, Project Success.*

I. INTRODUCTION

Construction by nature is inherently dangerous and the toll of accidents is high in terms of both costs and human suffering (Muir, 2005). Spillane et al (2012) observes that, poor co-ordination can cause over-crowding on building sites which can result in operatives sustaining trips and falls in the workplace. Kibe (2016) views construction health and safety as an economic as well as a humanitarian concern. The scholar further informs that, at least 60,000 fatal accidents happen in a year on construction sites around the world, despite the existence of Health and Safety standards on construction sites set by the International Labour Organization (ILO) and based on international conventions and recommendations on occupational health and safety.

The reports by Muir (2005); Spillane et al (2012) and Kibe (2016) indicates the need for better management of health and safety through a paradigm shift and management approach

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and the development of an integrated health and safety management framework.

II. OBJECTIVES OF THE STUDY

- To assess the impact of health and safety management on construction projects success in Nairobi County.
- To propose a framework for effective construction health and safety management in Nairobi County.

III. LITERATURE REVIEW

Cheng and Li (2004) have explored construction safety management in China. Their paper presented the views of construction participants on; site safety knowledge, factors affecting site safety and methods for improving project safety management. In Nigeria, Olubunmi et al (2014) investigated the perception of professionals on construction site management practices. The scholars pin pointed health and safety management as one of the critical site management element that needs to be effectively managed.

Kenya is not an exception to research pertaining construction health and safety management. A study by Muiruri and Mulinge (2014) has looked into the health and safety measures used on construction sites, the enforcement mechanisms of health and safety regulations and the challenges encountered in the management of health and safety. The study acknowledge that, construction sites are considered risky with frequent and high accident rates and ill-health problems to workers, practitioners and end user.

A. Modern Technologies for Health and Safety Management

Given the short-comings in the current practice of health and safety management in the construction industry, the importance of modern technologies in achieving improved project delivery cannot be over emphasized. Inspections and safety reporting are constants at the jobsite but remain highly manual processes (ORACLE, 2017). Oracle Prime Projects cloud service enables users to centralize and automate management of these vital, yet resource-consuming requirements - from scheduling inspections, tracking commissioning steps and managing safety issues to closing out the punch list. Nyabioge et al (2018) acknowledge that, radio frequency identification device (RFID) technology provides information of all workers and their location thus,

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In the event of an emergency, supervisors would know, in real time, who is where for safe evacuation. Drones can be mounted with survey equipment that can exactly recreate a digital 3D representation of a site, allowing construction teams to preempt health and safety complications and come up with workarounds ahead of time (Parsons, 2017). Wong et al (2014) discusses Autodesk Navisworks software and how it can be used to manage site space for safe operations through 4D simulations.

IV. RESEARCH METHODOLOGY

A survey to investigate health and safety management factors was delimited to 45 on-going commercial/ mixed urban development projects each worth more than Kshs100 million in Westlands constituency, Nairobi County. The study achieved a response rate of 80% from the construction project managers hence, it was satisfactory to provide necessary information for the analysis. Data analysis was carried out using both descriptive and inferential (through correlation analysis) statistical methods. Goodman and Kruskal's Gamma was applied in correlation analysis since the health and safety management variable was measured on an ordinal scale.

V. RESEARCH FINDINGS

A. Response Rate

Out of the 45 questionnaires sent 36 were received. This represented 80% of the sampled population. Mugenda and Mugenda (2003) as cited by Kibe (2016) recommends that, a response rate of 50% is fairly adequate, therefore a response rate of 80% in this case was considered to be representative of the study population.

Table 1: Response Rate

Respondent	No. of Questionnaires		Percentage Return %
	Sent	Returned	
Construction project managers	45	36	80%

Source: Field survey, 2017

B. Demographic Characteristics of the Respondents

Table 2: Construction Project Managers' Experience

Experience (yrs.)	Mid value (X)	Frequency(F)	FX
Less than 5	2.5	7	17.5
5-10	7.5	14	105
10-15	12.5	10	125
Over 15	15.0	5	75
Total		36	322.5
Mean Years of Experience = $\Sigma FX / \Sigma F = 8.96$			

Source: Field survey, 2017

Table 2 depicts that, the construction project managers had a mean of 8.96 years of experience. The experience of the respondents supports the belief that, people with long experience are more conscious and conversant with strategies of handling health and safety management challenges. The

study also confirms the views of Kibe (2016) who is of the opinion that, working experience is likely to influence construction health and safety management as workers with long experience are more conscious of health and safety risks associated with construction works.

C. Correlation Analysis

Table 3: Health & Safety Management Correlations

Rank	Variable	Goodman & Kruskal Gamma (γ)	ASE
Q3	Please rank each of the following factors affecting the site H&S in order of their importance.		
1	Close proximity of individuals to operation of large plant and machinery	0.5480	0.237
2	Workplace becoming over-crowded	0.5271	0.236
3	Lack of top mgnt support in the mgnt of H&S in construction sites	0.4793	0.203
4	Difficulty in ensuring proper arrangement and collection of waste materials on-site	0.0725	0.276
5	Difficulty in controlling hazardous materials and equipment on-site	-0.2195	0.300
6	Lack of equipped first aid kits on the construction sites	-0.1429	0.302
7	Inadequate personal & protective equip.	-0.0769	0.338
8	Inadequate welfare facilities	-0.0148	0.283
9	Unawareness of H&S matters among the workers	0.0000	0.359
Q4	Please indicate how you monitor H&S in your project		
1	Regular inspections	-0.4588	0.261
2	Safety tours	-0.2694	0.258
3	Checklist systems	-0.0650	0.273

Source: Field survey, 2017

The top four variables under factors affecting the site health and safety indicated a positive relationship with project success, the next four variables showed an inverse relationship while the last variable showed no relationship with project success. All variables used in monitoring health and safety had inverse correlations with project success.

All construction sites had health and safety officers who ensured that construction workers were following the established policies and safety regulations. The photos taken during the site surveys as illustrated by figure 1 justifies the health and safety measures at construction sites. However, it was observed that the use of face masks and gloves were very minimal in most construction sites. The evidence is as tabulated in table 4. This result is in line with that of Kibe (2016), pointing out minimal usage of face masks (6.7%) and gloves (6.6%) in construction jobsites.

Table 4: Health & Safety Management Deficiencies on Sites

Variable	Values	Frequency	(%)	Cumulative Frequency
Use of face masks	Yes	9	25	100
	No	27	75	75
Use of gloves	Yes	7	19	100
	No	29	81	81

Source: Field survey, 2017



Source: Field survey, 2017

Fig 1: Health & Safety Measures at Construction Sites

VI. CONCLUSIONS AND RECOMMENDATIONS

The construction project managers gave a positive response in the research by answering the questionnaires to their best of knowledge. The findings indicated that, there is no well-defined site management system in the Kenyan construction industry and most sites are run through intuition and processes that involves a lot of paper work (checklists). This study therefore recommends use of Oracle prime Projects Cloud Service, radio frequency identification device (RFID) technology and drones to monitor construction site activities. The study also recommends use of Autodesk

Navisworks software to carry out 4D simulations of the site hence, promoting safe operation.

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