The Relationship Between Risk Management and Safety, Health, Environment and Quality Policy Implementation Among Zambian Contractors

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Abstract

The study aimed at ascertaining whether National Council for Construction (NCC) registered contractors classified in Grade One employ safety, health, environment and quality (SHEQ) to mitigate risks at projects. The study also sought to establish the SHEQ policies employed in the construction industry and the risks incurred due to non-conformance with policies. An exploratory sequential mixed method was adopted in which a structured interview guide and a questionnaire was used as data collection tools from a sample of 54 respondents out of which 38 (72%) responded. Data was analysed using Statistical Package for Social Sciences (SPSS) version 26.0. Findings reviewed that leadership, individual behaviour, management commitment, and communication are correlated to the implementation of SHEQ policy. Risk management variables established are safety and health performance, managed construction costs, and quality and environmental performance. Risks encountered by contractors for not implementing SHEQ were political, economic, social, technical, environmental, legal, and management risks. It was established that failure to employ SHEQ policies had a high impact on the management of risks on site, hence, a strong correlation between SHEQ policy implementation and risk management. The study recommends the use of the developed risk management framework that incorporates SHEQ to mitigate risks.

Keywords

Construction Industry, Grade One Contractors, Implementation, Risk Management, Safety Health Environment and Quality Policy.

1. Introduction

The construction sector plays an important role in growing economies and employment creation world over for millions of unskilled, semi-skilled, and skilled workforces (Claris, 2017). According to the Labour Force Survey 2018, in the European Union (EU) 12.7 million workers (7.9 % of the total EU-15 workforce) are employed in the industry. However, the International Labour Organisation (ILO) (2019) estimated that 6,300 people die every day as a result of work-related diseases and injuries which is more than 2.3 million deaths per year globally. According to Mwanaumo and Mambwe (2019), the ILO report (2018) indicated that the construction industry accounts for 30-40% of the world's fatal injuries with nearly 100,000 workers killed each year and 4% of GDP is the estimated cost of occupational accidents and ill-health in all sectors. According to Donkoh et al. (2015), about 60,000 fatal accidents happen on

construction sites around the world each year and one in each six work-related fatal accidents happens on a construction site.

Kanchana et al. (2015) pointed out that of the Indian construction workforce, of which 7.5% is the total world labour force, 16.4% of fatal global occupational accidents is from India. Similarly, it was found by Windapo (2013) that 44% of Nigerian contractors recorded low levels of compliance to health and safety regulations and witnessed 23 fatalities. While in South Africa, Okoro et al (2016) stated that the building and construction sector is one of the high-risk sectors with construction motor vehicle accidents alone being 984 in 2010 and 892 in 2012 and construction associated fatalities totaled about 150 every year and the industry suffer about 400 accidents each year. In 2013, there were 9,858 accidents and 93 fatalities; in 2014, 8099 accidents and 50 fatalities recorded, and 258 accidents and 56 fatalities, in the construction sector in South Africa (Construction Industry Development Board (CIDB), 2018). Mwanaumo et al. (2018) stated that the possibility of a fatality in the construction industry is five times more likely than in the manufacturing industry, whereas the risk of a major injury is two and a half times higher. In the study by Mambwe and Mwanaumo (2017a) they noted that the report by ILO indicated 165 out of every 1,000 workers are injured on the job and the highest accident rate was among construction workers regardless of which industry the projects are being implemented. Mwanaumo and Mambwe (2019) further stated that this has led to shortages of skilled labour in the construction industry and poor job retention.

In Zambia, the construction industry has continued to play a very important role in the economy and contributed 9.9% to the Zambian GDP growth (World Bank, 2018). According to Zambia's 7th National Development Plan, the industry has continued to grow over the past 12 years at a steady annual average rate of 17.5%. This growth has been directly attributed to increased foreign direct investment (FDI), and public and private sector investment on infrastructure development using public-private partnership (PPP) strategies (Mambwe, et al., 2020; Kalebuka, et al., 2016). Despite the growth of the construction industry in Zambia, and it being a driver for job creation and a contributor to economic growth, the industry has continued to record incidents which are a source of fatalities, injuries, occupational diseases and accidents (Mambwe & Mwanaumo, 2017a).

Mambwe and Mwanaumo (2019) ascribed that some of the reasons why the sector is prone to accidents and fatalities are the condition of the physical environment of work, nature of construction work operations, construction methods, construction materials, heavy-duty equipment used, and physical properties of the construction sites. According to Mutwale-Ziko et al. (2017) and Mwanaumo and Mambwe (2019) the statistics in Zambia indicate that an average of 1,200 accidents and diseases are reported to the Workers Compensation Fund Control Board (WCFCB) each year to settle compensation claims in respect of occupational accidents and diseases. Additionally, Mambwe and Mwanaumo (2017a) in their study on worker involvement pointed out that employees are not availed with essential information on working conditions, are not given personal protective equipment (PPE), work in deplorable work environments, are not aware of the prevention of certain diseases at project sites such as HIV/AIDS. In the recent studies by Mambwe et al. (2020), Mwanaumo and Mambwe (2019) and Mustapha et al. (2018), they noted that the high risks and poor performance in implementing safety, health, environment and quality (SHEQ) policies in the construction industry are due to workforce casualization, changing work environment, the method of work used, the nature of the job itself, and gaps in the legislation that cause unhealthy work sites.

Hence, the study established the relationship between the policies attributed to SHEQ and risk management in the Zambian construction industry by using the case of Grade One contractors registered with the National Council for Construction (NCC). The study identified the SHEQ policy attributes critical to implementing SHEQ in the construction industry and risks management framework attributes. A risk management framework that include the SHEQ policy as a means to mitigate incidents was also developed.

2. Literature Review

According to Hamid et al. (2019) Safety and Health Environmental, and Quality (SHEQ) Management System is an integration of three management systems which include Safety and Health Management System (OHSAS 45001:2018), Environmental Management System (ISO 14001:2015) and Quality Management System (ISO

9001:2015). The ISO 45001:2008 advocates for a safety and health management system policy that incorporates the ten (10) elements: context of the organisation; leadership and worker participation; documented information; continuous improvement and hierarchy of control; focus on management of risk and ongoing assessment of risk and opportunities; demonstrate and understand compliance; procurement, outsourcing and contractors; and use of performance indicators. However, the SHEQ management system establishes a single, defined safety and health, environmental, and quality management system that integrates into the work planning and execution processes to successfully protect the clients, workers, public, and the environment (Hamid, et al., 2019). Mwanaumo and Mambwe (2019) stated that SHEQ implementation is becoming a global phenomenon that firms need to comply with on various regulations so that they can remain competitive in the business environment. They further alluded that firms that have a SHEQ policy framework in their operations guide all the functional structures aiming to achieve zero harm. In Indonesia, Maheswari et al. (2019) posit that SHEQ has been used in managing risks associated with waste management and environmental pollution caused by the improper processing of electronic waste, especially from mobile phones. Mustapha et al. (2018) carried out an inquiry into the health and safety management practices of contractors in South Africa and the results of the study revealed the majority of firms have a formal health and safety policy statement that incorporates communication, employee engagement, annual reports, competence of employees and subcontractors in health and safety, training and provision of guides and manuals.

In Zambia, Mambwe and Mwanaumo, (2017a; 2017b) carried out two studies in the area of the application of safety, health and environment (SHE) and occupational health and safety risk management in Zambia. Their study indicated that there was a relationship between management involvement and organizational safety culture in the management of SHE in the electricity distribution industry. Further, they revealed that although most industries in Zambia were not completely in the dark with the issue of worker participation, there was room for improvement. Worth mentioning was that workers take more responsibility and ownership if they participate in safety meetings, when management is involvement, and are motivated; this creates a positive safety culture, ease of reporting as well as openness and honesty, which can be achieved through communication as highlighted by Mambwe and Mwanaumo (2017a). Other studies defined roles and responsibilities (Mutwale-Ziko, et al., 2017), active participation of clients and role players (Mwanaumo, et al., 2018), regulatory compliance (Mustapha, et al., 2018) provision of welfare facilities (Chisumbe & Mwanaumo, 2016), management strategies and safety culture (Mwanaumo & Mambwe, 2019), and quality (Sithole, 2018). These and many studies show that there are several policies employed to manage SHEQ and can be adopted for the Zambian construction industry. The SHEQ policy variables include leadership and accountability, management commitment (Mwanaumo & Mambwe, 2019), individual behaviour, communication (Ali, 2011), organization infrastructure, suppliers/contractors/customers, strategic planning (Claris, 2017), performance monitoring (Chandi & Kahilu, 2019) and continuous improvement (Mwanaumo & Mambwe, 2019).

2.1 Risks Associated with Lack of SHEQ policy Implementation

According to Windapo (2013) the major risks associated with contractors at projects by failure of implementing SHEQ policies include, injuries due to falling, fatal accidents, slips or fall, being struck, explosion or fire, contact with electricity shocks. Mwanaumo (2013) identified risks contractors encounter due to failure to employ SHEQ policies and grouped them as human related safety risks, equipment related risks, material related risks, work-related risks, environmental-related risks. These risks have been categorised into technical, political, social, economic, legal, financial, health, managerial and cultural risks according to the Health and Safety Executives (HSE) (2018) and Frost (2016). Renault and Agumba (2016) stated that human factor risks are highly encountered at projects due to failure to implement SHEQ policies. According to Mwanaumo and Mambwe (2019) effective implementation of safety and health can minimize accident rates and, thus, lower the compensation paid out to employees and/or their families. They further argued that legal compliance, time saving, cost saving, increased efficiency and customer satisfaction once attained, are beneficial outcomes of a SHEQ management system for a firm. Hence, the need to develop a framework that incorporates both risk management and the SHEQ policy so that risks can be mitigated at the same time SHEQ policy implementation is being done for reduced incidents.

However, existing risk management frameworks with the incorporation of SHEQ policy are limited in literature. Most of them that exist do no incorporate aspects of quality and environmental management (Skeepers & Mbolwa, 2015; Aboagye-Nimo, 2013; Renault & Agumba, 2016). Frost (2016) proposed objectives, risk evaluation, integration, perception, risk factors, constraints, other factors and monitoring and reviewing risks, as key variables for a risk

management framework. Pillay (2014) argued that a management framework should have communication and consultation, establishing the context, identifying hazards, assessing risks, controlling risks, and monitoring and reviewing risks. The best risk management framework variables adopted from studies done by HSE (2018), Renault and Agumba (2016) and Pillay (2014) were adopted for the study. The variables include risk policy, establishing the context, risk identification, risk assessment, risk monitoring and risk evaluation, risk control and close risk.

3. Methods

The study adopted an exploratory sequential mixed method approach with an embedded research design where interpretation was based on the qualitative and quantitative results. The research used interviews and a semi-structured questionnaire for the collection of data. To determine the population, a register from the NCC for all Grade 1 contractors in buildings (Category B) with active projects in Lusaka, was attained and used. The regulatory authorities namely the National Council for Construction, the Engineering Institution of Zambia (EIZ), members of the Zambia Institute of Architects (ZIA) and the Zambia Public Procurement Authority (ZPPA) an institution responsible for regulating procurement were also part of the target population due to their role in the sector. A total of 65 participants was the population targeted for the study who are involved in projects within Lusaka. To determine the sample size, the Slovin's formula formulated in 1960 as shown in equation 1:

$$n=N/\Sigma\,[1+N\,(e)^2] \qquad \textbf{Equation 1}$$

Where n =Sample size; N =Population size; e = Margin of error or Error of Tolerance. In this study the population size (N) = 62, Margin of error (e) 5%, with 95% confidence level. The sample size for the study was 53.679, that is, **54** respondents were considered as targets to take part in the study. Convenience sampling in which respondents are chosen based on their convenience and availability due to limited resources, time, and workforce availability was used (Creswell, 2014). Purposive sampling techniques was adopted because the target sample had an active site in Lusaka to be included on the study list and the study targets professionals such as project managers, supervisors, foremen, safety officers, and organizations such as parastatals and quasi-government institutions, government ministries/departments with previous work experience in construction projects.

The first phase of the study was a comprehensive literature review on the subject matter from various regions. According to Creswell (2014) a literature review is essential to the research because it assists in collecting the basic knowledge essential for survey development. The methodology involved a desk analysis using, indexed Journals, Books, and other academic research resources at the University Libraries. The second phase of the study focused on the collection of primary data using structured and unstructured questionnaire for face-to-face on-site interviews and questionnaire survey. To determine the relationship between independent and dependent variables, the survey questionnaire was developed with a five-point Likert scale ranging from 1 (for "Strongly disagree") to 5 (for "strongly disagree"). The survey data was analysed using Statistical Package for the Social Sciences (SPSS) version 16 for correlation and simple regression analysis at 95% confidence level. Microsoft Excel for Descriptive analysis was achieved using the mean, median, standard deviation, and frequencies.

4. Data Analysis, Numerical and Graphical Results

The following is the data presentation and analysis of findings from interviews and questionnaire and survey.

4.1 Interview Data Presentation

Out of the target of 10 interviews to be conducted, eight interviews were successfully conducted representing 80% of the interview results of which of the responses were almost the same. Interviewees were coded for anonymity.

On the question on effectiveness of risk governance structures in place among contractors in Zambia, the interviewees stated that "*there are currently structures that exist that are clearly defined with roles and responsibilities*". The interviewees also stated that risk officers or safety offices are attached to contracting firms including the project sites. It was evident at one of the sites visited, the availability of safety officers who were in-charge of taking care of all health and safety issues.

On whether the Zambian contractors incorporate risk management in their implementation of SHEQ policies, the respondent stated that "*contractors incorporate risk management though its implementation. Contractors try to minimize costs associated with risk management*." Further, they pointed out that, risk management was compromised due to contractors' desire to save on risk management costs and maximize their profits. They also indicated that Contractors had difficulties following safety regulations especially international firms. This failure to follow existing regulations on risk management was attributed to a poor enforcement of regulations and high political interference when regulators try to enforce them. Additionally, the interviewees mentioned that he cost of risk management, health, and safety management was as high as 10% to 15% of the project cost, causing the contractors to compromise on either safety or quality for them to save and increase their profit margin.

On the question of commitment demonstrated by contractors in Zambia to uphold good risk management practice, the research revealed that "*the commitment was low, and this was attributed to most of Grade One contractors of foreign origin, dominated by the Asians, undermining health and safety standards over the years*". The research further revealed that "*commitment could be written on paper but the reality on the ground was different. Incentives were lacking in Zambia for firms that managed risks well*". Also, the research revealed that "negative incentives such as penalties for failure to follow regulations existed. The National Council for Construction also made regular visits to the site to ensure that contractors performed to expected standards". Finally, it was revealed that "contractors were adjusting and showing commitment because they had realized that failure to follow safety guidelines and standards was very costly for them if found wanting by authorities or when an incident was recorded on site". Commitment and demonstration of upholding risk management practices were also reflected in the reports they evidently shared in which occurrence of incidents on many sites in Zambia was on the rise.

4.2 Questionnaire Survey Findings

The questionnaire was sent to a sample of 54 respondents out of which 38 respondents whose responses were considered valid. This represented 72% and was considered acceptable according to Creswell (2014).

4.2.1 The SHEQ policies employed in Zambia's Construction Industry

In this question, the respondents were asked to state what constituted, at a minimum, the nature of the SHEQ policies employed in Zambia's construction sector.

Table 1. The nature SHEQ policy variables employed by contractors in Zambia

SHEQ Policy Implementation variables	Strongly disagree	Disagree	Moderate	Agree	Strongly agree
	1	2	3	4	5
SHEQ Policy	0	0	42.1%	31.6%	26.3%
Management Commitment	0	0	34.2%	39.5%	26.3%
Leadership and Accountability	0	0	42.1%	31.6%	26.3%
Communication	2.6%	2.6%	23.7%	42.2%	28.9%
Clear guidelines and compliance to Regulations	0	0	44.8%	28.9%	26.3%
Involvement of employees in SHEQ processes activities	0.4%	10.2%	28.9%	36.8%	23.7%
Supplier/contractor/customer engagement	2.6%	13.2%	28.9%	31.6%	23.7%
Zero harm, environmental sustainability and quality products or services	0	2.6%	28.9%	42.2%	26.3%
Training roles and responsibilities	0	5.3%	28.9%	39.5%	26.3%
Performance monitoring, review and responsibilities	2.7%	2.6%	26.3%	39.5%	28.9%

From the results in Table 1, policy leadership and accountability attributes generally are provided for by the Zambian contractors in informing SHEQ policy including management leadership and commitment, accountability roles and responsibilities. With regards to roles, responsibilities being documented and communicated to, Zero-harm environmental sustainability and quality products or services, the results indicated that generally, most respondents agreed that the nature of SHEQ policies employed in Zambia's construction sector provided the attributes with a rate of 42.2%. This was not the case for the involvement of employees, supplier/contractor/customer engagement, and performance monitoring, review and responsibilities, since some of the respondents felt that they were not adopted in

the nature of SHEQ policies employed in Zambia's construction sector. Training roles and responsibility was generally affirmative in nature with SHEQ policies developed in Zambia with only 5.3% indicating a non-affirmative result.

4.2.2 Critical variables that need to be adopted in the implementation of SHEQ policies

The study rated key variables that should be used in the implementation of SHEQ policies so that risks of health and safety at workplaces can be mitigated. The four critical variables that were rated of the extent of influence were found to be leadership and accountability, individual behaviour, communication and management commitment s indicated in Figure 1.

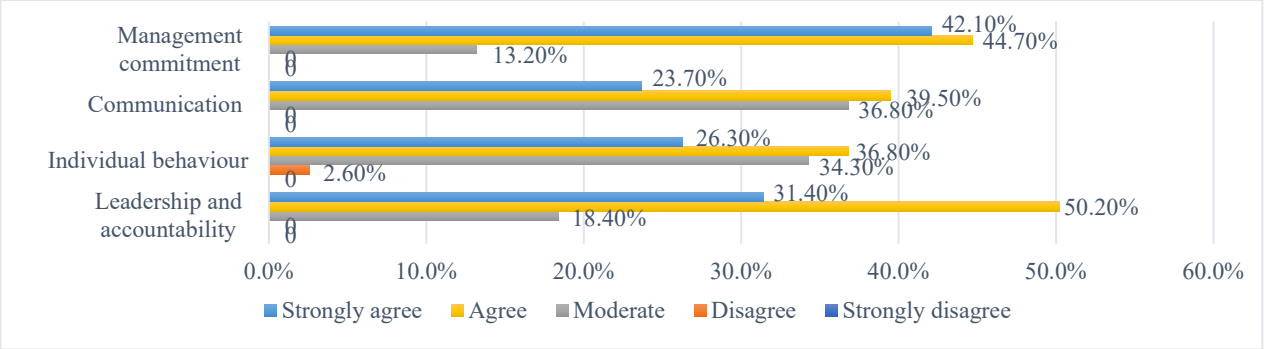

Figure 1. Critical SHEQ policy variables for adoption at implementation

The results indicated that majority of respondents rated leadership and accountability as "highly" (50.2%) in mitigating or reducing health and safety risks on the project site in Zambia, since over half felt that it was critical. The individual behaviour, though had some respondents disagreeing (2.6%) of it being critical, generally showed positive affirmation that ranged from "moderate", to "very high". This was the case for communication, even though there was no rating for disagreement. Management commitment had both "agree" (44.7%) and "strongly agree" (42,1) which were reasonably high ratings. The second lowest rating was also management commitment (13.2%).

4.2.3 Best-fit risk management variables for the risk management framework that adopts the SHEQ policies in Zambia's construction industry

The adopted variables for a best-fit risk management framework were all generally accepted according to Table 2. Majority of the respondents agreed that all the variables had the ability to positively impact and give the best-use risk management framework that would incorporate the SHEQ policy provision. The most highly accepted variables were risk policy and risk control, both of which had the score 39.5%. They were followed by risk identification (36.8%) and risk assessment (34.2%) with respect to "strongly agree". Those that agreed with the highest rate include risk identification, assessment, motoring and risk evaluation, and closing risk. No variables were rated "disagree" and "strongly disagree".

Table 2. Best-fit Risk management framework variables

Risk management framework variables	Strongly disagree	Disagree	Moderate	Agree	Strongly agree
	1	2	3	4	5
Risk policy	0	0	21.0%	39.5%	39.5%
Establishing the context	0	0	28.9%	39.5%	31.6%
Risk identification	0	0	18.5%	44.7%	36.8%
Risk assessment	0	0	23.7%	42.1%	34.2%
Risk monitoring and risk evaluation	0	0	23.7%	44.7%	31.6%
Risk control	0	0	21.0%	39.5%	39.5%
Close risk	0	0	31.6%	44.7%	23.7%

4.2.4 Expected outcomes of implementing SHEQ policies that integrate with risk management at construction projects

The rating of the outcomes expected due to the implementation of a risk management framework that integrates with the SHEQ policies at construction projects was done. According to Table 3, the respondents perceived improved health and safety performance and improved quality and environmental performance as having very high impact, considering that they had a higher rate of agreement (42.1%). Reduced construction schedule delays and lower risk of exposure outcomes were giving a generally lower to poor affirmation rate to have influence after the SHEQ policy integrated with the risk management framework is implemented (21.1% and 10.5% respectively). Managed construction costs had an average rating of 39% in terms of the influence of SHEQ policies.

Table 3. Expected outcomes

Expected outcomes	Strongly disagree	Disagree	Moderate	Agree	Strongly agree
	1	2	3	4	5
Improved health and safety performance	15.8%	5.3%	18.4%	42.1%	18.4%
Reduced construction costs	5.3%	7.9%	39.4%	34.2%	13.2%
Improved quality & environmental performance	7.9%	7.9%	31.6%	42.1%	10.5%
Reduced construction schedule delays	10.5%	21.1%	34.2%	26.3%	7.9%
Lower risk of exposure	10.5%	10.5%	36.8%	34.2%	7.9%

4.2.5 Testing of the Four Critical variables in relation to the outcomes

The implementation of SHEQ policies that impact on risk management was tested for correlation using Pearson Correlation with the focus on the critical independent variables of the study (Leadership and accountability, management commitment, individual behaviour, and communication) and dependent variables namely reduced construction cost, improved quality and environmental performance, improved health and safety performance, reduced construction schedule delays, and lower risk of exposure as indicated in Table 4.

The study revealed that leadership and accountability had significant correlation reaching at 0.333(*) with a 0.05 confidence level (2-tailed); reduced construction costs were correlated at 0.461(**) with a significance level of at 0.01 (2-tailed); for improved quality and environmental performance the results indicated a correlation of 0.572 (**)at 0.01 confidence level (2-tailed) (See Table 4). Reduced risk of exposure was 0.350 (*) with 0.05 confidence level (2-tailed). In terms of individual behaviour, there was a significant correlation at 0.356 (*) at 0.05 level (2-tailed); on reduced construction costs, 0.471(**) correlation significance at 0.01 level (2-tailed) for improved quality and environmental performance, and 0.528(**) correlation significance at 0.01 level (2-tailed) for improved safety and health performance (See Table 4). This indicated that leadership and accountability and individual behaviour are vital aspects of managing costs, improving quality and environmental performance and improving health and safety.

Management commitment results revealed a low correlation at 0.134 significant on reduced construction costs and reduced construction schedule delays which could be attributed to other factors that impact the cost of construction such as the economy (inflammation). However, the correlation was positive, hence, it had an impact but at a lower level. A negative correlation indicates a zero impact. It revealed 0.371(*) correlation significance at the 0.05 level (2-tailed) for improved quality and environmental performance, and 0.564(**) correlation significance at the 0.01 level (2-tailed) for improved health and safety performance. The results, therefore, indicate that management commitment was very vital to improved management of costs, reduced occupational health and safety problems, and improved quality & environmental performance on site. With regard to communication, the study revealed a low correlation at 0.243 on managed construction costs, 0.174 reduced construction schedule delays, and low correlation at 0.293 on improved quality and environmental performance indicating that its impact was low on these two variables. The correlation was positive therefore had an impact but at a lower level. A negative correlation indicates a zero impact. However, the study revealed a significant correlation at 0.483 (**) correlation at 0.01 level (2-tailed) for improved safety and health performance as indicated in Table 4. The general contribution of communication remains critical to managed construction costs, improved quality and environmental performance, and improved occupational health and safety performance on site.

Table 4 Correlation Test Results

Variables		Leadership and accountability	Individual behaviour	Communication	Management commitment	Reduced construction schedule delays	Reduced cost of construction	Improved quality & environmental performance	Improved health & safety performance	Lower risk of exposure
Leadership & accountability	Pearson Correlation	1	.776**	.587**	.623**	.151	.333*	.461**	.572**	.350*
	Sig. (2-tailed)		.000	.000	.000	.364	.041	.004	.000	.031
	N	38	38	38	38	38	38	38	38	38
Individual behaviour	Pearson Correlation	.776**	1	.779**	.604**	.254	.356*	.471**	.528**	.300
	Sig. (2-tailed)	.000		.000	.000	.124	.028	.003	.001	.068
	N	38	38	38	38	38	38	38	38	38
Communication	Pearson Correlation	.587**	.779**	1	.605**	.174	.243	.296	.483**	.265
	Sig. (2-tailed)	.000	.000		.000	.296	.142	.071	.002	.107
	N	38	38	38	38	38	38	38	38	38
Management commitment	Pearson Correlation	.623**	.604**	.605**	1	.164	.134	.371*	.564**	.407*
	Sig. (2-tailed)	.000	.000	.000		.324	.424	.022	.000	.011
	N	38	38	38	38	38	38	38	38	38
Reduced construction schedule delays	Pearson Correlation	.151	.254	.174	.164	1	.624**	.510**	.027	-.202
	Sig. (2-tailed)	.364	.124	.296	.324		.000	.001	.873	.223
	N	38	38	38	38	38	38	38	38	38
Reduced cost of construction	Pearson Correlation	.333*	.356*	.243	.134	.624**	1	.753**	.092	-.092
	Sig. (2-tailed)	.041	.028	.142	.424	.000		.000	.585	.582
	N	38	38	38	38	38	38	38	38	38
Improved quality & environmental performance	Pearson Correlation	.461**	.471**	.296	.371*	.510**	.753**	1	.330*	.112
	Sig. (2-tailed)	.004	.003	.071	.022	.001	.000		.043	.505
	N	38	38	38	38	38	38	38	38	38
Improved health & safety performance	Pearson Correlation	.572**	.528**	.483**	.564**	.027	.092	.330*	1	.419**
	Sig. (2-tailed)	.000	.001	.002	.000	.873	.585	.043		.009
	N	38	38	38	38	38	38	38	38	38
Lower risk of exposure	Pearson Correlation	.350*	.300	.265	.407*	-.202	-.092	.112	.419**	1
	Sig. (2-tailed)	.031	.068	.107	.011	.223	.582	.505	.009	
	N	38	38	38	38	38	38	38	38	38

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

5. Discussion and Validation

The study aimed at ascertaining whether NCC registered contractors classified in Grade One implement SHEQ policies to mitigate risks at projects so that the attributes of these policies can be established. This was done in order to determine attributes that can be used for integrating risk management framework, so that a model that addresses both risk management and SHEQ implementation policies can be developed. From the interviews, it was revealed that the integration of risk management and SHEQ policies at projects in the construction industry was low due to poor enforcement of regulations by authorities. Contractors had difficulties following safety regulations due lack of employer health and safety policy enforcement while others paid little attention to health and safety on site. The level of involvement by the employer was very low in enforcing health and safety risk management on site because they took it as a contractor responsibility. This is in agreement with the findings by Mwanaumo and Mambwe (2019) and Mutwale-Ziko et al. (2017) who both mentioned that despite the creation of institutional, legal, and policy guidelines in Zambia, the levels of compliance to health and safety regulations by contractors were largely low and alarming, posing a great risk to workers in the construction sector.

The study also identified the nature and influence of SHEQ policies and if they influenced implementation of SHEQ in the construction industry. About ten attributes were found to influence SHEQ implementation, and these include management commitment, SHEQ policy, leadership and accountability, communication, clear guidelines & compliance to regulations, involvement of employees in SHEQ processes activities, supplier/contractor/customer engagement, zero harm, environmental sustainability & quality products or services, training roles and responsibilities, and performance monitoring, review and responsibilities. These were in tandem with several studies that adopted their use in mitigating risk such as accident, injuries, fatalities and diseases at construction sites (Mwanaumo & Mambwe, 2019; Fuller, 2019; Mustapha, et al., 2018; Agumba & Haupt, 2018; Mambwe & Mwanaumo, 2017a). In the same vain, the results indicate that majority of respondents agreed that implementing SHEQ in the construction sector generated a lot of positive results. Further, the results indicate that employed SHEQ policies improved risk management, saved human life due to no injuries and fatalities, improved site cost management such as saving in sick costs, savings in insurance premiums, saving in material damage, saving in the working day lost cost, and improved site cost management such as saving in sick costs, savings in insurance premiums, saving in material damage, saving in the working day lost cost on construction site in Zambia. This is in line with the studies by Zou and Sunindijo (2015), Mwanaumo 2013, and Akpan (2011) whose studies were conducted in the construction industry.

The study found that leadership and accountability, individual behavior, communication and management commitment were very critical for to adoption influence SHEQ at construction projects in Zambia. This conclusion is in agreement with that of Mambwe and Mwanaumo (2017b), and Skeepers and Mbolwa (2015) both of whom mentioned that commitment, leadership and accountability improve the safety culture in the organisation at the same time advancing the level of individual behaviour towards SHEQ. According to Mambwe and Mwanaumo (2017b) when there is safety culture in an organisation or at project site the level of incidents such as accidents, injuries, fatalities and ill-health are reduced and in most cases eliminated. Hamid et al. (2019) noted that most accidents in the construction industry can be avoided by deploying proper management system. While Mwanaumo and Mambwe (2019) argued that human factors that affect behavior of individuals were the main causes of accidents, it is imperative to note that this is not the only cause of all the accidents. As regard communication, which rated highly in this study, the results are in tandem with Aboagye-Nimo et al. (2011) who wee of the view that communication was key to preventing health and safety risks on site. Any complicated communication system would hinder risk management. While management commitment is essential to reduce health and safety risks as per the results, it was also mentioned in the study done by Mambwe and Mwanaumo (2017b) that there is a relationship between management involvement and organizational safety culture in the management of safety, health and environmental risks. The critical variables were found to have a strong relationship with the expected outcomes.

The study established that the outcomes of its implementation include improved health and safety performance, reduced construction costs, improved quality and environmental performance, reduced construction schedule delays, and lower risk of exposure. The outcomes agree with those attained by Agumba and Haupt (2018), Chandi and Kahilu (2019) and Windapo (2013). The outcomes were strongly correlated with the critical factors, leadership and accountability, individual behavior, communication and management commitment, and are expected once the risk management framework integrated with the SHEQ management policies is implemented.

The Proposed Risk Management Framework Incorporating SHEQ policy

From the study results, it was found that the best-fit risk management framework as advanced by HSE (2018), Renault and Agumba (2016) and Pillay (2014) and they include risk policy, establishing the context, risk identification, risk assessment, risk monitoring and risk evaluation, risk control and close risk. The firms need to create an enabling environment for the management of risks and SHEQ implementation. This was done through the firm's organization strategy approved by the board and full mandate given to management to run with it. This also entails factoring in SHEQ in all these processes. Therefore, all business processes for contractors can integrate SHEQ policies with risk management for them to benefit from risk management. The study integrated the planning stage from the Plan-Do-Check-Act Deming Cycle (Henshall, 2020).

Additionally, identifying all small risks, medium, or mega ones, and documenting the risks in the appropriate risk register was found to be essential. In assessing and quantifying each risk, the contractor have to ascertain the probability of the risk occurring and the consequences of its occurrence and also develop response strategies such as, avoid risk, treat risk, transfer risk, accept and exploit risk. When risks are identified, recorded in the register, and assessed, they must be monitored and assigned to an officer responsible for mitigating them. Lastly, evaluation and determining if the process adds value to the overall organization strategy and progress must be done. This leads to the closing of the risk after mitigation. The strategy was not part of the scope of this study. However, embedded in this study, was the SHEQ policy implementation processes in which policy, leadership and accountability, management commitment, communication, and individual behaviour were found to be vital in the implementation of projects and were included in the model as illustrated in Figure 2.

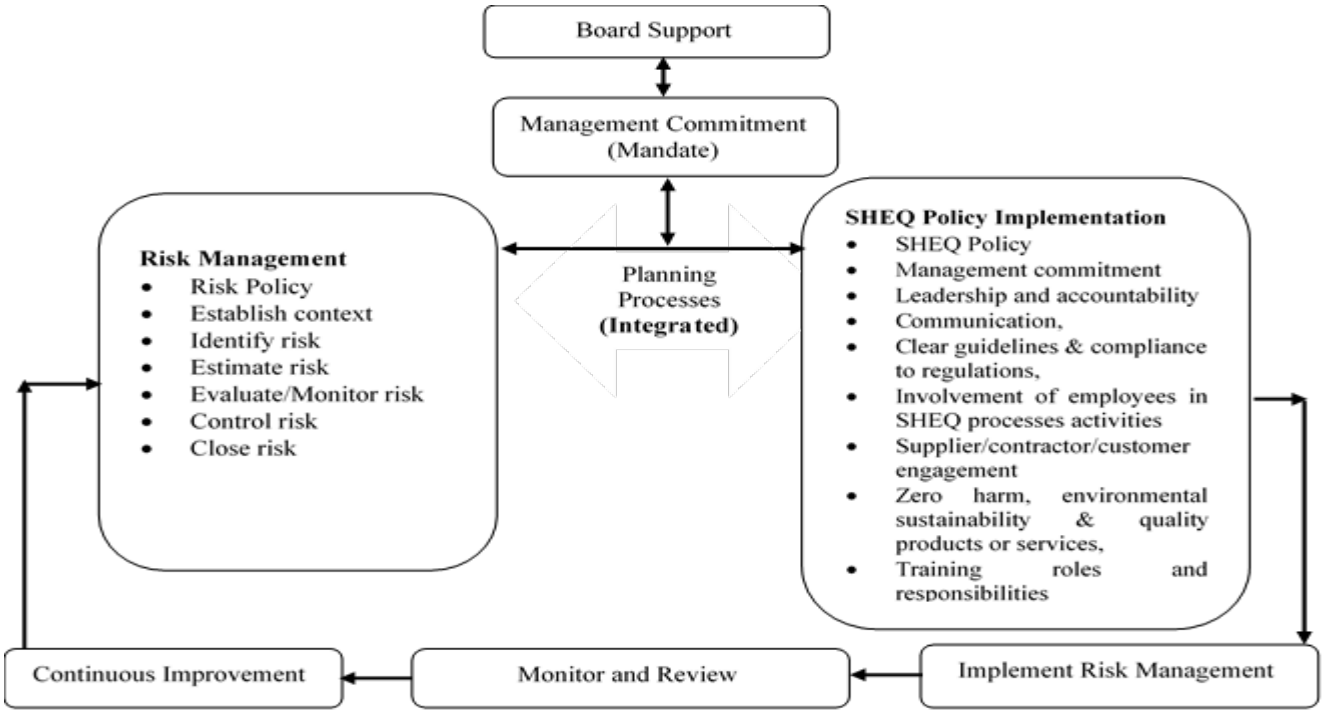

Figure 2 Risk Management Framework Incorporating SHEQ Policy

6. Conclusion and Recommendations

The study sought to establish the impact that employed SHEQ policies had on the management of risk and proposed the best risk management framework with the incorporation of SHEQ. The study found that the SHEQ policy, management commitment, leadership and accountability, communication, involvement of employees in SHEQ processes activities, supplier/contractor/customer engagement, zero harm, environmental sustainability and quality products or services, training roles and responsibilities and performance monitoring, review and responsibilities, are variables that can be adopted in construction by contractors when implementing SHEQ management systems. Among

them four critical variables with a strong correlation to the expected outcomes were found to be leadership and accountability, individual behaviour, communication and management commitment. The study hence, concluded that a risk management framework that incorporates SHEQ policy variables would be an effective tool to reduce incidents at projects such as accidents, injuries, fatalities and ill-health.

The study recommends possible adoption of the proposed risk management framework that incorporates SHEQ policy variables to mitigate health and safety risks. The study further recommends the implementation of the established variables as a means to reduce incidents at construction projects by contractors in Zambia. The study was limited by the outbreak of the Covid-19 which hindered collection of data as most respondents were working on shifts.

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