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A Framework for Enhancing Quality Assurance Practices of Building Contractors

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Abstract

The quality of building construction projects in Kenya has been a challenge throughout recent years. The purpose of this study was to assess the extent to which contractors apply quality assurance practices and thereafter develop a framework to enhance quality assurance practices of building contractors in Kenya. Ten quality assurance practices were identified from literature review and their importance ranked by respondents through a questionnaire survey. The level and frequency of application of the practices was assessed using relative importance index. The most important practices were process control, management responsibility and, inspection and testing. The least ranked were internal quality audits, and control of inspection, measuring and test equipment. The most frequently applied practices were process control, inspection and testing, and purchase control. The least frequently applied practices were training, internal quality audits, and control of equipment. The findings of this study provide a tool for enhancing quality assurance practices of building contractors through the use of ISO 9001 standards and Force Field Analysis.

Keywords: Contractors; force field analysis; framework; ISO 9001; quality assurance

INTRODUCTION

The construction industry in Kenya is an important sector in the economy. In 2022, the sector accounted for 5.3% of the county's GDP (KNBS, 2022) indicating the value and contribution it has to the economy. However, despite the significant contribution it offers, the sector continues to face challenges of consistently producing quality construction projects. A study carried out in 2020 by the National Construction industry on failure and collapse of buildings in Kenya highlighted that 87 buildings had collapsed between 2015 and 2019. Building failures have continued to be evident in each subsequent year despite the findings of such research.

Rampant building failure and collapse is indicative of ineffective quality assurance practices. Researchers have strived to establish a lasting solution to the menace but the problem is still persistent. Kuta (2017) assessed the influence of ineffective regulation and supervision on construction of substandard buildings in Kenya. Bucha et al. (2020) on the other hand, sort to establish a relationship between the legal framework governing the construction industry in Kenya and mitigation of building failure and collapse. In a subsequent study, Bucha et al., (2021) proposed the use of contextual frameworks to mitigate building failures in Kenya. The authors suggested that stringent penalties and sanctions should be applied on unethical professional in the construction industry. There was however no documented research work on frameworks or models dealing with quality assurance of construction projects in Kenya.

Beyond the Kenyan borders, there have been different attempts by researchers to develop frameworks and models to enhance quality of construction projects (Corona-Suárez et al., 2014; Delgado-Hernandez & Aspinwal, 2010; Durdyev et al., 2018; Feng et al., 2020; Nasirzadeh et al., 2013; NCA, 2019). However, none of the frameworks and models addressed quality assurance practices of contractors and more so by incorporating ISO 9001 Quality Assurance (QA) elements and Force Field Analysis. The framework proposed in this study aims at integrating the benefits of ISO 9001 standards to set a desired level of quality assurance, and the use of Force Field analysis to

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assess factors acting in favour of and those against achievement of QA.

THEORY

Concept of Quality Assurance

Quality Assurance (QA) has evolved from a manufacture-centred discipline to one with broad management implications across all industries and professions. Researchers and scholars have studied the concept and defined quality assurance in various ways. According to ISO 9000 (or BS 5750), quality assurance is "those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality." ISO 8402-1994 defines quality assurance as "all the planned and systematic activities implemented within the quality system, and demonstrated as needed, to provide adequate confidence that an entity will fulfil requirements for quality." Rumane (2011), defines QA as the activity of presenting proof to convince everyone concerned that quality-related tasks are being carried out successfully. Similarly, Caldas et al. (2015), notes that QA in construction involves practices used in the project to ensure that the standard of the work is consistent in terms of quality.

Quality Assurance Practices

Quality assurance practices, as derived from the above definitions, are activities which ensure that the product achieves client satisfaction, fitness for purpose, and meets required quality standards. They are activities which provide high probability that objectives of the construction project will be achieved. Quality assurance practices are the organized activities which are implemented systematically to prevent anticipated problems in the construction process.

Although there are different standards used to guide quality assurance practices of construction projects, ISO 9000 standards have proved to be one of the successful approaches across the world (Ofori & Gang, 2001). The ISO 9000 family offers recommendations for how to implement quality assurance procedures in an organization (Chan, 1996). In the building sector, ISO 9001 is appropriate for businesses involved in design-and-build projects, such as domestic home construction. While some building contractors may model their quality system after ISO 9002, the bulk of them operate following a plan provided by the architect or engineer (Leung & Chan, 1999). A building construction company's quality system should adhere to either ISO 9001 or ISO 9002, depending on whether designing permanent works is a component of the business's operations.

The benefits that businesses receive from having their operations certified to the ISO 9000 series of quality management systems are covered in construction management literature. Ofori & Gang, (2001) highlight that the most significant advantages of ISO 9000 certification obtained by contractors are enhanced business image and improved operational procedures. Landin (2010), notes that ISO certification is a concern for different building companies to increase competitiveness and make them more efficient. Landin (2010) however reveals that several ideas found in the quality system standard are seen to be too complex and challenging to understand. This is however contrasted by Chini and Valdez (2001) who state that the implementation of ISO 9000 in the construction sector is achievable through adoption of generic principles and customizing to specific project requirements.

Ribeiro (2000) assessed the applicability of twenty ISO 9001 quality assurance elements through a survey of large construction firms in Portugal. The findings indicated that the most important quality assurance requirements for contractors were those that affect the performance of building works, with process control being the most important followed by the requirement of management responsibility. The ten most important quality assurance requirements for contractors were associated with management responsibility, process control, inspection and testing, quality system, corrective and preventive actions, control of nonconforming product, training, design control, internal quality audits, and document and data control. The least important quality assurance requirement was associated with statistical techniques.

Existing Models of Enhancing Quality

A number of models related to quality in construction have been developed by various researchers. These models either seek to measure the level of quality or establish relationships that exist between variables related to quality. Chen and Luo (2014) developed a 4D BIM-based quality model which aimed to assist project participants to better understand the quality progress and to collaborate more effectively. Guo et al. (2018) sort to address the problem of quality in construction by developing a system dynamics model based on evolutionary game theory for quality supervision among the project owner, construction supervising engineer, and construction contractor.

A model based on Partial Least Squares Structural Equation Modelling (PLS-SEM) that explained and identified the critical factors affecting quality in social infrastructure projects was developed by Hussain et al. (2018). The authors aimed to find out the relationships between construction, stakeholders, materials, design, and external factors, and how these relate to project quality. Alfahham and Alajeeli (2020), motivated by the lack of tools and methods used to measure construction quality, developed a predictive model to improve the quality of building construction projects. The research focused on the quality of government building construction projects and aimed to provide necessary information for owners, project managers, designers, and contractors. Other frameworks and models were developed by Corona-Suárez et al. (2014); Delgado-Hernandez & Aspinwal (2010); Durdyev et al. (2018); Feng et al. (2020); Nasirzadeh et al. (2013); and NCA (2019)

There was however no existing model of enhancing quality in construction that was based on quality assurance practices derived from ISO 9000 standards and one which incorporated Force Field Analysis. ISO 9000 standards have proved to be one of the successful approaches across the world in enhancing quality practices in organizations. Force Field analysis on the other hand is an effective method of identifying forces working for and those working against a desired change. The proposed model combines the ten most important ISO 9001 quality assurance elements, obtained from literature, with Force Field analysis to ensure enhanced quality assurance practices of building contractors.

RESEARCH METHODS

The study adopted a survey research design. Sampling was carried out from a list of 3,796 contractors obtained from the National Construction Authority register. A sample size of 341 was calculated using a formula advanced by Gill et al. (2010). The contractors were sampled using stratified random sampling to cater for the different categories of registration. Based on the findings of Ribeiro (2000) who assessed applicability of twenty ISO 9001 quality assurance elements through a survey of construction firms, ten most important quality assurance practices were identified.

Questionnaires were developed and contractors required to rate the relative importance of the quality assurance practices. A five-point Likert scale ranging from one (not important) to five (extremely important) was used to indicate the importance of the quality assurance practices to building contractors. Contractors were then asked to indicate which quality assurance practices they applied and to what extent when carrying out building construction projects. A four-point Likert scale ranging from one (Not applied) to four (frequently applied) was adopted. Relative Importance Index (RII), mean, and standard deviation techniques were used to analyse quality assurance practices of building contractors. Data was presented in tabular forms and the framework developed thereof presented in form of a figure.

RESULTS

Respondents' Response Rates

The research elicited a response rate of 57% with 193 questionnaires out of 341 being returned. A response rate of 50% and above is usually considered adequate (Mugenda & Mugenda, 2003).

Importance of Quality Assurance Practices to Building Contractors

Ribeiro (2000), Sweis et al. (2014) and Shahsavand et al. (2018) used Relative Important Index (RII) to calculate the relative importance of different attributes. This study adopted a similar approach. The equation below was used to determine the RII of each QA practice:

$$RII = \frac{\sum w}{AN} = \frac{5_{n5} + 4_{n4} + 3_{n3} + 2_{n2} + 1_{n1}}{5N}$$

Where:
w = the weighting assigned to each factor by respondents ranging from 1 to 5
(n1 = number of respondents for not important,

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n2 = number of respondents for slightly important, n3 = number of respondents for neutral, n4 = number of respondents for very important, n5 = number of respondents for extremely important)

A = the highest weight (5 in this case)

N = total number of respondents

The RII values should range between 0 and 1 with 0 not inclusive (El-Sawalhi & Hammad, 2015). The higher the value of RII, the more important the QA practice is to the contractor. The mean was also used to assess the ranking of the QA practices. When two or more means are the same, the standard deviation is used to rank the items. The level of importance was divided into three groups for ease of analysis. A range of one to two denoted weak importance, three represented moderate importance and a range of four to five denoted strong importance. The degree of importance based on RII was interpreted according to **Table 1**.

As presented on **Table 2**, all ten quality assurance practices were important to contractors in ensuring quality assurance of building projects. The most important practices as indicated by the mean and RII were process control, management responsibility, and inspection and testing. The least important practices were training, internal quality audits, and control of inspection, measuring and test equipment.

Quality Assurance Practices Adopted by Building Contractors

As presented in **Figure 1**, the most frequently applied practice out of the possible ten was process control, inspection and testing, and purchase control. The least frequently applied practices were training, internal quality audits, and control of inspection, measuring and test equipment.

TABLE 1

Importance level based on RII

Range of Index	Importance
8.0 ≤ RII ≤ 1.0	Extremely important
0.6≤ RII < 0.8	Very important
0.4 ≤ RII < 0.6	Neutral
0.2 ≤ RII < 0.4	Moderately important
0.0≤ RII < 0.2	Not important

Source: Sakhare & Patil, 2019

Despite the contractors' rating all ten quality assurance practices as important, findings similar to Ribeiro (2000), only one quality assurance practice, process control, was frequently applied **Table 3**. The other nine practices were only applied sometimes according to the survey. The practice with the least mean, indicating the least frequently applied, was control of inspection, measuring and test equipment rarely applied by contractors.

DISCUSSION

The importance of the quality assurance practices compared to the extent of application by the contractors created a need for the development of a framework. The motivation was to improve the extent of application of all practices to 'frequently applied'. By so doing, quality assurance practices of building contractors would be enhanced. The framework development comprised of four distinct stages. The first stage involved evaluation of the construction company's level of quality assurance. The second stage was a Force Field Analysis to determine driving and restraining forces affecting quality assurance practices of the company. The third stage involved change management through unfreezing the status quo, implementing the change initiative, and refreezing the company quality assurance practices to ensure the change is entrenched. Finally, the fourth stage dealt with evaluation of the effects of the change initiative. The evaluation stage assessed whether the expected quality assurance outcomes were achieved through implementation of the change initiatives.

Evaluation of the Construction Company's Level of Quality Assurance

Improvement of contractors' quality assurance practices is preceded by an assessment of the current level of quality assurance. The latter therefore became the initial step towards enhancing quality assurance practices of contractors. Effective measurement of quality assurance was preceded by identification of measurement criteria to be employed in the process. **Table 4** presents the measurement criteria, as identified from ISO 9001 standards and literature review, for evaluating quality assurance of a construction company based on the ten quality assurance practices.

TABLE 2
Ranking of relative importance index of quality assurance practices

No.	Quality Assurance Practice	Respondents Scoring			Mean	Std. Dev.	Total	RII	Rank
		≥4	3	≤2					
1	Process control	175	2	16	4.508	0.879	193	0.871	1
2	Management responsibility	162	6	19	4.477	0.952	193	0.866	2
3	Inspection and testing	173	3	17	4.451*	0.865	193	0.849	3
4	Corrective and preventive actions	172	5	16	4.451*	0.859	193	0.781	4
5	Purchase control	169	6	18	4.306	0.916	193	0.772	5
6	Quality management system	160	7	26	4.295	1.046	193	0.759	6
7	Control of non-conforming work	166	4	23	4.280	0.949	193	0.748	7
8	Training	160	4	29	4.254	0.975	193	0.725	8
9	Internal quality audits	150	11	32	4.119	1.119	193	0.680	9
10	Control of inspection, measuring and test equipment	146	10	37	4.057	1.173	193	0.673	10

Note: *The rank is based on standard deviation value
Source: Author, 2023

TABLE 3
Descriptive statistics for application of quality assurance practices

No.	Quality Assurance Practice	N	Mean	Std. Dev.	Level of Application
1	Process control	193	3.55	1.089	Frequently applied
2	Inspection and testing	193	3.24	1.126	Applied sometimes
3	Purchase control	193	3.17	1.094	Applied sometimes
4	Corrective and preventive actions	193	3.16	1.128	Applied sometimes
5	Management responsibility	193	3.06	1.048	Applied sometimes
6	Control of non-conforming work	193	2.95	1. 094	Applied sometimes
7	Quality management system	193	2.79	1.155	Applied sometimes
8	Training	193	2.67	1.123	Applied sometimes
9	Internal quality audits	193	2.54	1.011	Applied sometimes
10	Control of inspection, measuring and test equipment	193	2.51	1.229	Applied sometimes

Source: Author, 2023

In order to ensure effective measurement of quality assurance, the sources of data needed to be objective and reliable. **Table 5** provides possible sources of data for measurement of the ten concepts of quality assurance.

Force Field Analysis
After evaluation of the level of quality assurance, the next stage was to assess the forces acting for and those against achievement of the required level of quality assurance. Force Field analysis was used to evaluate these forces. Force Field analysis, developed by Kurt Lewin, is an approach based on analysis of driving forces and restraining forces. Driving forces are the forces that drive the change while restraining forces are those that resist the change. Driving forces are the positive forces which influence or support the change initiative whereas restraining forces are the negative forces that create hinderances against the change initiative (Swanson & Creed, 2014). The driving forces that supported quality assurance practices of contractors are presented in **Table 6**. Restraining forces that hinder achievement of

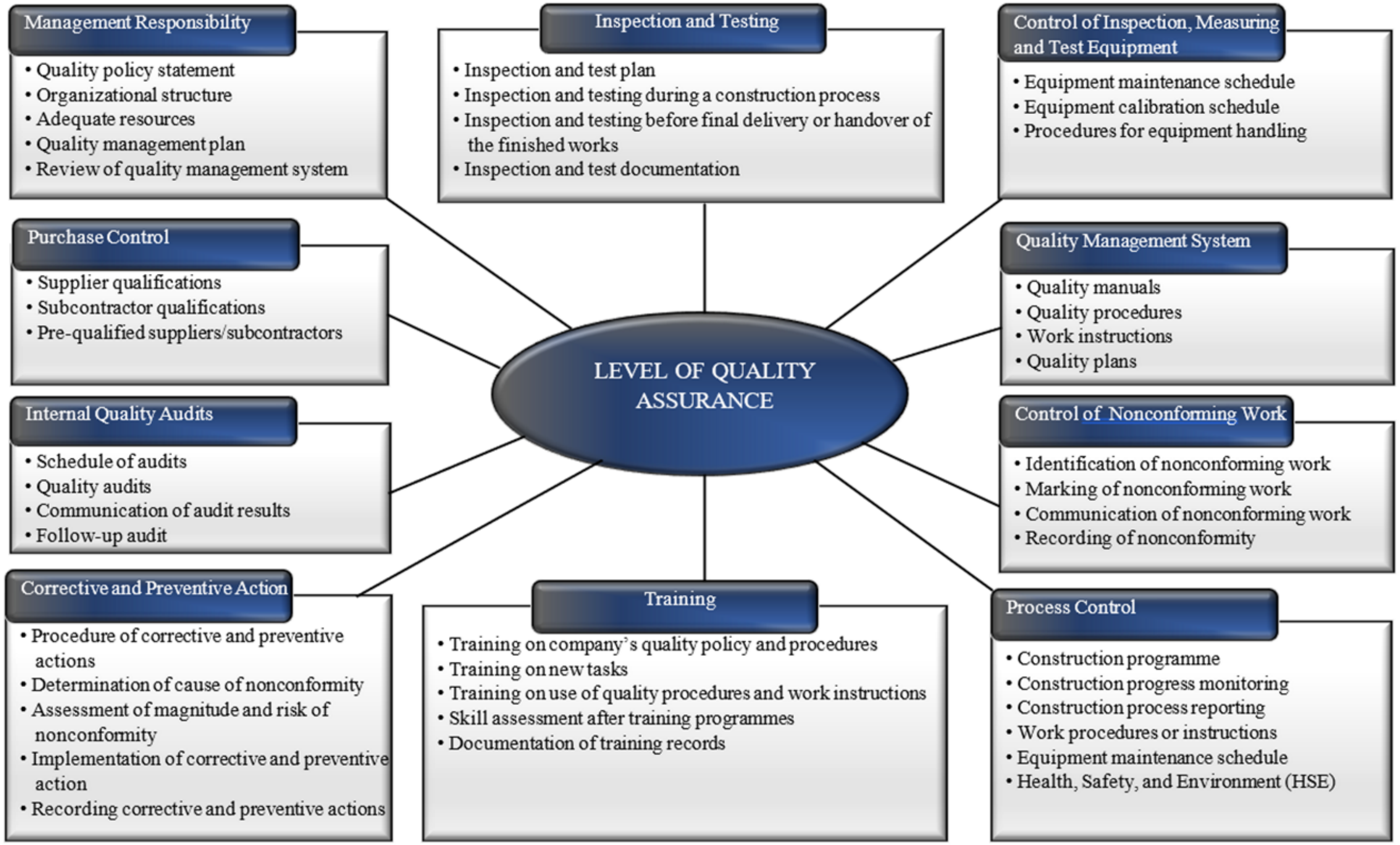

FIGURE 1
A Framework for Evaluating the Level of Quality Assurance of Building Contractors in Kenya
Source: Author, 2023

TABLE 4
Measurement criteria for evaluating quality assurance of a construction company

No.	Quality Assurance Practice	Measurement Criteria
1	Management responsibility	• Quality policy statement
		• Organizational structure
		• Adequate resources
		• Quality management plan
		• Review of quality management system
2	Quality management system	• Quality manuals
		• Quality procedures
		• Work instructions
		• Quality plans
3	Purchase control	• Supplier qualifications
		• Subcontractor qualifications
		• Employee qualifications
		• Pre-qualification of suppliers/subcontractors
4	Process control	• Construction programme
		• Construction progress monitoring
		• Construction process reporting
		• Work procedures or instructions
		• Equipment maintenance schedule
		• Health, Safety, and Environment (HSE)
5	Inspection and testing	• Inspection and test plan
		• Inspection and testing during a construction process
		• Inspection and testing before final delivery or handover of the finished works
		• Inspection and test documentation
6	Control of inspection, measuring and test equipment	• Maintenance and calibration of self-owned equipment
		• Maintenance and calibration of hired and subcontractor owned equipment
		• Procedure of handling of equipment
7	Control of non-conforming work	• Identification of nonconforming work
		• Marking of nonconforming work
		• Communication of nonconforming work
		• Recording of nonconformity
8	Corrective and preventive action	• Procedure of corrective and preventive actions
		• Determination of cause of nonconformity
		• Assessment of magnitude and risk of nonconformity
		• Implementation of corrective and preventive action
		• Recording corrective and preventive actions
9	Internal quality audits	• Schedule of audits
		• Quality audits
		• Communication of audit results
		• Follow-up audit
10	Training	• Training on company's quality policy and procedures
		• Training on new tasks
		• Training on use of quality procedures and work instructions
		• Skill assessment after training programmes
		• Documentation of training records

Source: Author, 2023

the required level of quality assurance are stated as negative statements of the driving forces as presented in **Table 7**.

Change Management

For contractors to meet quality standards of building projects, their quality assurance practices have to be enhanced. This change is crucial because construction companies operate in growing, highly competitive business environments. After identifying driving and restraining forces, the contractor then has to manage the desired change. A change from the current equilibrium point has to take place by either increasing driving forces that promote quality assurance, reducing restraining forces that hinder quality assurance, or both. In order to manage this change, the Kurt Lewin's change model which involves three stages; unfreezing, change, and refreezing, was adopted.

Evaluation of Effects

It was expected that the implementation of the strategies would bring about the intended outcomes of quality assurance. The goal of quality assurance is to make sure that construction projects meet the desired quality standards without pushing back the schedule or incurring additional costs. Though the following list is not exhaustive, it represents some of the expected characteristics of a contractor with enhanced quality assurance; cost saving, minimized risk of time and cost overruns, project requirements and expectations are met, customer satisfaction, improved project management, improved productivity, increased efficiency, and enhanced safety.

Proposed Framework for Evaluating Quality Assurance Practices of building Contractors

The framework was divided into two; part one provided details of the level of quality assurance measurement framework while part two provided the overall framework for enhancing quality assurance practices of building contractors. **Figure 1** illustrates part one of the framework while **Figure 2** illustrates the second part.

CONCLUSION AND RECOMMENDATIONS

The importance of quality assurance in construction cannot be over emphasized and any initiative towards improvement of quality is received positively. The benefits of improved quality assurance practices to a construction company include increased cost saving, minimized risk of time and cost overruns, reduced cases of litigation, improved customer satisfaction, improved project management, improved productivity, increased efficiency, and enhanced safety. Researchers, practitioners, and government agencies have developed frameworks and models to enhance quality in construction. Whereas some approaches aimed at incorporating BIM with a product, organization and process data definition structure (Chen & Luo, 2014), others sort to address the problem of quality in construction by developing a system dynamics

TABLE 5
Identification of sources of data

No.	Quality Assurance Practice	Source of Data
1	Management responsibility	Quality management documents. Project financial records
2	Quality management system	Quality management documents
3	Purchase control	HR Staff records. Pre-qualification list of suppliers/subcontractors.
4	Process control	Construction programme. records of safe working procedures. records of safety training. Equipment maintenance records
5	Inspection and testing	Test plans. Test results
6	Control of inspection, measuring and test equipment	Schedule of calibration. Records of calibration. Maintenance schedule. Equipment manuals
7	Control of non-conforming work	Reports. Snag list.
8	Corrective and preventive action	Reports Snag list.
9	Internal quality audits	Audit checklist. Quality records and reports. SOPs for quality audits
10	Training	Staff records

Source: Author, 2023

TABLE 6
Driving forces that support quality assurance practices of contractors

No.	Quality Assurance Practice	Driving Forces
1	Management responsibility	• Provision of a quality policy statement
		• Well defined organizational structure
		• Minimal number of complaints related to lack of adequate resources (human resource, materials, and equipment)
		• Availability of quality management plan
		• Evidence of periodic review of quality system
2	Quality management system	• Availability of quality manuals
		• Availability of quality procedures
		• Availability of work instructions
		• Availability of quality plans
3	Purchase control	• Documented minimum supplier qualifications
		• Documented minimum subcontractor qualifications
		• Documented minimum employee qualifications
		• Documented list of pre-qualified suppliers/subcontractors
4	Process control	• Comprehensive construction programme for entire project
		• Documented regular monitoring and reporting of work progress
		• Documented regular monitoring and reporting of work processes
		• Provision of documented procedures or work instructions for non-routine processes
		• Provision of equipment maintenance schedule
		• Documented procedures for Health, Safety, and Environment
5	Inspection and testing	• Availability and use of inspection and test plan
		• Documentation of inspection and testing during a construction process
		• Documentation of inspection and testing before final delivery or handover of the finished works
		• Complete records of all inspection and test work performed
6	Control of inspection, measuring and test equipment	• Maintenance and calibration records of self-owned equipment
		• Maintenance and calibration records of hired and subcontractor owned equipment
		• Documented procedures for equipment handling
7	Control of non-conforming work	• Prompt identification of nonconforming products or services
		• Marking of non-conforming work
		• Timely alerting concerned persons of existence and location of nonconforming work
		• Record keeping of identified nonconformity
8	Corrective and preventive action	• Documented procedure of corrective and preventive actions
		• Determination of cause of nonconformity by authorized person
		• Assessment of magnitude and risk of nonconformity by authorized person
		• Implementation of corrective and preventive action by authorized person
		• Documentation of corrective and preventive actions
9	Internal quality audits	• Documented schedule of audits covering all activities related to quality
		• Documented periodic quality audits and results
		• Prompt and effective communication of audit results to management
		• Follow-up audit on all activities related to quality to verify corrective action
10	Training	• Training on company's quality policy and procedures
		• Training before they are assigned to new tasks
		• Training personnel on the use of quality procedures and work instructions
		• Skill assessment of personnel after training programmes

Source: Author, 2023

TABLE 7
Restraining forces that hinder quality assurance practices of contractors

No.	Quality Assurance Practice	Restraining Forces
1	Management responsibility	• Lack of a quality policy statement
		• Lack of well-defined organizational structure
		• Large number of complaints related to lack of adequate resources (human resource, materials, and equipment)
		• Unavailability of quality management plan
		• Lack of periodic review of quality system
2	Quality management system	• Lack of quality manuals
		• Lack of quality procedures
		• Lack of work instructions
		• Lack of quality plans
3	Purchase control	• Lack of documented minimum supplier qualifications
		• Lack of documented minimum subcontractor qualifications
		• Lack of documented minimum employee qualifications
		• Lack of documented list of pre-qualified suppliers/subcontractors
4	Process control	• Uncomprehensive construction programme for entire project
		• Lack of documented regular monitoring and reporting of work progress
		• Lack of documented regular monitoring and reporting of work processes
		• Absence of documented procedures or work instructions for non-routine processes
		• Lack of equipment maintenance schedule
		• Absence of documented procedures for Health, Safety, and Environment
5	Inspection and testing	• Unavailability and lack of use of inspection and test plan
		• Lack of documentation of inspection and testing during a construction process
		• Lack of documentation of inspection and testing before final delivery or handover of the finished works
		• Incomplete records of all inspection and test work performed
6	Control of inspection, measuring and test equipment	• Lack of maintenance and calibration records of self-owned equipment
		• Lack of maintenance and calibration records of hired and subcontractor owned equipment
		• Lack of documented procedure for equipment handling
7	Control of non-conforming work	• Delayed identification of nonconforming products or services
		• Not marking of non-conforming work
		• Delayed alerting concerned persons of existence and location of nonconforming work
		• Lack of record keeping of identified nonconformity
8	Corrective and preventive action	• Absence of documented procedure of corrective and preventive actions
		• Lack of determination of cause of nonconformity by authorized person
		• Lack of assessment of magnitude and risk of nonconformity by authorized person
		• Lack of implementation of corrective and preventive action by authorized person
		• Lack of documentation of corrective and preventive actions
9	Internal quality audits	• Absence of documented schedule of audits covering all activities related to quality
		• Absence of documented periodic quality audits and results
		• Delayed and ineffective communication of audit results to management
		• Lack of follow-up audit on all activities related to quality to verify corrective action
10	Training	• Lack of training on company's quality policy and procedures
		• Lack of training before they are assigned to new tasks
		• Lack of training personnel on the use of quality procedures and work instructions
		• Lack of skill assessment of personnel after training programmes

Source: Author, 2023

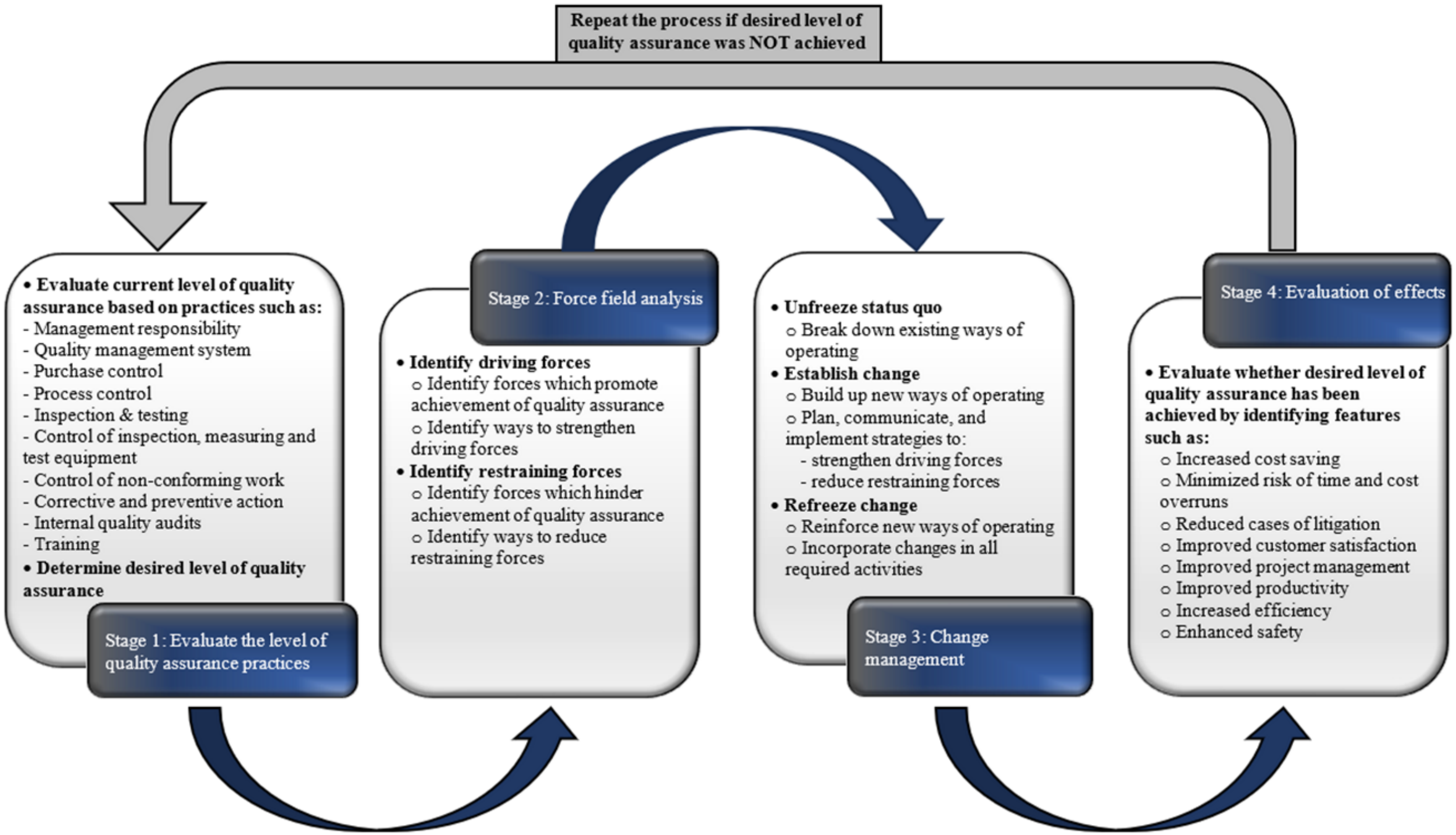

FIGURE 2
Framework for Evaluating Quality Assurance Practices of Building Contractors in Kenya
Source: Author, 2023

model based on evolutionary game theory for quality supervision (Guo et al., 2018), while others developed a model based on Partial Least Squares Structural Equation Modelling that explained and identified the critical factors affecting quality in social infrastructure projects (Hussain et al., 2018). It was therefore felt that there was need to develop a more comprehensive model to overcome these limitations.

Ten elements of quality assurance derived from ISO 9001 standards formed the basis of the survey. Registered building contractors were requested to respond to questionnaires by ranking the importance of the QA practices to the contractor. Respondents were then requested to indicate which QA practices they applied and to what extent when carrying out building construction projects. The outcome of the survey indicated that despite rating the ten QA practices as important, nine out of the ten were not frequently applied. This necessitated the need to develop a framework to act as a guide to frequently applying quality assurance practices in construction projects.

A quality assurance framework which involved: evaluation of the construction company's level of quality assurance; a Force Field Analysis to determine driving and restraining forces affecting quality assurance practices; a change analysis using Kurt Lewin's change model; and an evaluation of the effects of the change initiative, was developed. Development of the quality assurance framework sought to add to the available tools of enhancing quality in the construction industry since quality concerns are still evident in building projects. Construction industries need to embrace quality improvement initiatives such as this framework and tailor make it to suite their specific needs.

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