



Assessment of Quality Management Practices in Construction Firms in Nigeria

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ABSTRACT

The alarming rate at which collapsed buildings are witnessed in Nigeria has increased in recent times. More so, it remains indisputable that major construction projects contribute immensely to every nation's standard of living and economy. Therefore, the need to ensure adequate implementation of an efficient and reliable Quality Management System (QMS) in construction firms should always be emphasised. However, this study seeks to analyse quality management practices in construction firms, to suggest ways to improve quality control and service delivery. Eight respondents who are experienced engineers working with construction companies – fully registered with the Federal Capital Development Authority (FCDA) in Nigeria – were issued questionnaires (Qualitative analysis). The questionnaires encompass issues faced with QMS implementation in construction companies. Notwithstanding, results obtained from the field survey revealed that the application of QMS is mostly regarded as a means to fulfil contractual obligations and not necessarily to satisfy the client. In addition, it was established that top management needs to participate fully in setting quality policies that conform to ISO regulations to ensure the success of construction projects.

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INTRODUCTION

The term quality is defined from the construction industry perspective as meeting the requirements of the contractor and regulatory agencies as well as the owner. The impact of quality management on the reputation of the construction firm is very great, which could affect the organisation's growth and vision (Mane and Patil, 2015).

Since building facilities contributes immensely to the economy of every nation, the concepts of quality management in construction projects cannot be completely ruled out (Faroqui, Masood and Aziz 2008). To a reasonable extent, the growth of a country is somewhat reliant on the quality of its infrastructure and construction projects (Wasiu and Modupe 2012). However, Sanni and Windapo (2008) reported that the construction industry occupies a substantial percentage of the labour force in Nigeria. Consequently, the success or failure of any construction project can affect the country's economy either positively or negatively. Sadly, Total Quality

Management (TQM), which is the standard practice for most construction projects, has been sidelined by the majority of construction industries. This non-compliance to TQM by construction industries may be cause for the failure of some building or construction projects. According to Kado (2010), the main weakness of construction firms in Nigeria can be found in areas like staff training, awareness, "education and skills", objective measurement, feedback and natural use of total quality tools and techniques. In addition, the issues of contractors and clients engaging the services of quarks and the use of substandard building materials to cut costs can cause accidents either during or after construction.

However, some researchers have identified the concerns associated with quality standards in the construction industry (Rumane 2017; Lee et al., 2020). The most important concern of the construction industry in Nigeria is the increasing cases of collapsed buildings across the country recently (Abdulkareem and Adeoti, 2010). Invariably, quality can be defined



from the viewpoint of function - as to how closely the project conforms to standard requirements. With the earlier mentioned definition, a high-quality project is characterised by clarity in drawings, compliance of the project with design specifications, a fair completion price and easy maintenance. Based on the study conducted by ASCE (2005) study, quality can be characterised as follows:

- 1) Meeting the specifications of the owner concerning; quick completion of construction project within customer budget, functional adequacy and maintenance.
- 2) Meeting the specifications provided by the design professional with a properly-defined scope of work. In addition, to employ the services of qualified and experienced staff during construction of projects.
- 3) Provisions for up-to-date decisions by customer and design professional; also, provision of the contract to proceed with necessary work at a cost-effective fee with substantial time allowance.
- 4) Provision of contract details and specifications to permit the constructor to prepare a priced proposal.
- 5) Early decisions by the owner and design expert on authorisation and implementation of change orders; transparent interpretation of contract requirements from site design and inspection staff.
- 6) To conform to the requirements of regulatory bodies about public health and safety, environmental concerns, protection of public property and utilities, compliance with applicable laws, regulations, codes and ethics.

Furthermore, there is a difference between 'quality in fact' and 'quality in perception.' Those that provide services or goods that meet standard specifications achieve 'quality in fact'. Meanwhile, a rendered service or delivered product that matches the customer's expectations attains quality in vision (ASCE, 2005). Conversely, a product can possess high quality and yet it failed to meet customers' needs. An example of not meeting customers' demands is the case of the high-rise apartment buildings that were erected in the 1970s using state-of-the-art technology with minimised costs in California (ASCE 2005). In

short, the buildings were brought down later in the 1980s because people were reluctant to reside in these apartments, not minding the low rents that they were offered. The buildings did not meet the tenants' expectations of aesthetics, comfort and function (ASCE, 2005). One should also differentiate between 'product quality,' i.e. the quality of elements directly related to the physical products itself, and 'process quality,' i.e. the process that defines the acceptability of the product to prospective customers. For instance, product quality in construction firms may involve attaining quality in the technology and materials required to complete the structure.

However, this paper is aimed at analyzing quality management practices in relatively small construction firms in Abuja, to suggest ways for improved quality control and service delivery. In addition, this paper investigates if truly, building construction firms in Abuja (Nigeria) conforms to standard quality management practices.

More so, this paper is limited to the views of top management of firms, due to the firm's reluctance to allow the researcher firsthand access to assess the quality management practices on site.

LITERATURE REVIEW

Most construction projects require exorbitant costs to reach completion. Therefore, time and resources are important factors that determine the cost-effectiveness of any project. Failure in constructed facilities may cause project delays. Particularly, in the case where reconstruction of a structure is required, an increase in cost becomes inevitable. In worse scenarios, failures may cause personal injuries or casualties (Sanni and Windapo, 2008). To avoid the colossal increase in capital costs (due to reconstruction requirements) or the possibilities of fatalities caused by the occurrence of accidents, extensive research on quality control is very necessary. These qualitative procedures are particularly important to improve the construction process and delivery. However, if professionals such as architects, builders, engineers and contractors adhere strictly to standard quality management practices, the likelihood of construction failure or site mishap will be greatly minimised. Unfortunately, strict compliance to quality management systems (QMS) has not been the



case in most construction scenarios (Jimoh, 2012). Quality management system in the Nigerian construction industry is essential to achieving a successful project. QMS has been tested and used globally by engineers and is reliable at optimising the total cost throughout the project life (Aina and Wahab, 2011).

Quality Management in Nigeria

According to Kado (2010), the adoption of the British Standards Institution (BSI) publication and standard by Nigeria and the development of the National Building Code in 2007 are all steps towards enhancing the quality of building construction in Nigeria. In addition, there are laws, decrees, associations, authorities and regulatory bodies that are responsible for regulating building construction practices in the country. The establishment of the Nigerian Society of Engineers (NSE) was on February 6th, 1958 in London. Later on, NSE was inaugurated in Lagos on August 20th, 1960. Unfortunately, the Nigerian engineers had to deal with a hostile environment often faced with imposters of all sorts. Consequently, poor standards, numerous abandoned projects, fires, structural failure, and outright collapses have long been the order of the day (Yusuf, 2010). The consequences of this problem led to a colossal waste of human and material resources and damaged the reputation and morale of Nigerian engineers. The devastating effect of the state of affairs has slowed down the progress of the country which then attracted the attention of the government. Thus, the Engineers (Registration, etc.) Act (1970) was promulgated.

Unfortunately, the imposters could not be stopped through the registration of engineers alone. Therefore, further work was done by the Nigerian Society of Engineers in which an Act was amended in 1992 enabling the Council for registration of Engineers in Nigeria (COREN) with the full authority to register, control, oversee and enforce compliance in the construction industry. More so, there is the Association of Consulting Engineers Nigeria (ACEN) founded and registered in 1979. Invariably, the core objective of ACEN is to enhance the quality of Nigerian infrastructures at the most effective prices by ensuring strict compliance to quality management systems by competent and highly experienced professionals in the construction industry

(Kado, 2010). ACEN has a strong affiliation with the National Society of Engineers (NSE) and remains the umbrella association of all engineers.

Quality Management Systems in Construction

Globally recognised quality management standards include; The ISO 9000 series, Total Quality Management, Quality Control, Quality Assurance, Malcolm Baldrige (MB) standard and BS 5750 of the British Standard Institute (BSI), European Construction Institute (ECI) which produced the Matrix in 1993 (Kado, 2011).

Based on the ASCE manual reported in 2012, the fundamental essence of codes and ethics is to ensure the protection of the public about safety and health and environment and to ensure that conformity to standards is maintained at the early stage of the construction project. Substantial costs and delays could be incurred if compliance with appropriate codes and standards is not ensured at the beginning of construction projects. Therefore strict adherence to codes and standards while embarking on any building project must be practised by professionals to foster successful completion of construction projects.

Quality Assurance/Quality Control

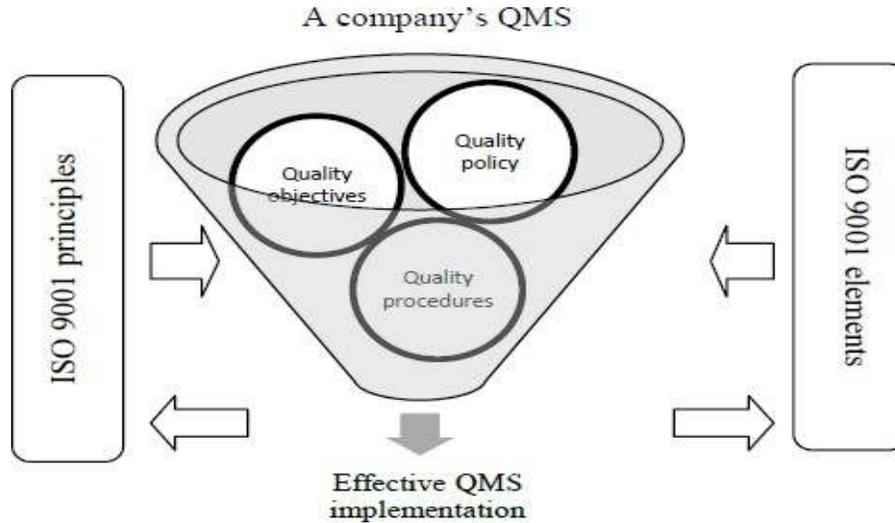
Ferguson and Clayton (1998) defined Quality Assurance (QA) as a program concerned with providing necessary quality in the work to meet the project design requirements. It is the sole responsibility of the design professional to develop an appropriate program for each project. QA guarantees protection against quality challenges through early identification of trouble beforehand.

In the early 20th century, building professionals and engineers were known to take full control of the design phase. They simply supervised the construction projects by ensuring that the owner received his money's worth in terms of quality (Zubairu, 2016). In the 1950s and 1960s, owners became increasingly concerned with cost, schedule and areas where design professionals were not providing good control (O'Brien, 1989). The emphasis continued to be on quality and control on quality and control of liability exposure. Almost simultaneously, the widespread use in the public sector, largely in the private sector, the

sealed bid competitions gave the owner the benefit of competitive prices. The general contractor is obliged to seek the benefits during construction to control costs and maintain a profitable position. As mechanical and electrical systems have become more complex, the general contractor is responsible for this work to

(an authorised external auditor) that its processes have been documented and that the company is systematically audited. The audit follows the necessary policies and procedures to produce high-quality products.

According to Rumane (2011), an organisation needs to demonstrate its ability to



subcontractors, including the quality control of its workforce (ASCE, 2005).

ISO 9000

The International Organization for Standardization in Geneva issued the first set of standards ISO 9000 in 1987. The term describes the series of international standards for product design, production, delivery, service and testing (American Society for Quality). The ISO 9000 series includes two types of standards: those relating to quality assurance and those relating to quality management. The quality control standards are designed for contractual assessment purposes and are ISO 9001, ISO 9002, and ISO 9003 (as directed by British Standards Institution). The quality management standard is ISO 9004, and it is designed to guide companies developing and implementing quality systems, (Doyle, 1994). A company registered as conforming to ISO standards has shown an accredited third party

consistently provide products that meet or exceed customer expectations and satisfaction while also adopting appropriate processes for the continued improvement of the QMS and related assurances of conformity to customer applicable regulatory requirements. A typical effective QMS implementation is indicated in Figure 2.1.

Watson and Howarth (2011) also pointed out that ISO 9001 is still based on the process that focuses on a compliance system in which rigorous assessment of the organisation is conducted against a standard. If the organisation passed all assessment tests, it is then offered accreditation. Effective QMS implementation is to ensure that work is performed according to the desired specifications throughout the design and development phase. In addition, customers must express satisfaction with the resulting products and services (Beaumont 2006).

Figure 2.1: Shows an effective ISO 9001 quality management system (Willard, 2012)

Total Quality Management Factors

The establishment of project quality requirements starts at the beginning of the project. As Arditi and Gunaydin (1997)

indicated, a balance between the owner's requirements of the project costs and schedule, desired operating characteristics, materials of construction, etc. In addition, the design

professional requires a realistic time estimates and budgets to meet those requirements during the design process. The design professional is also required to protect public health and safety in the context of the final completed project. Similarly, the construction company is responsible for the means, methods, techniques, sequences, construction procedures, safety measures, and programs during the construction process. The project

requirements are the key factors that define the quality of the construction process. Figure 2.2 illustrates a typical quality management procedure in construction firms. The construction process can be divided into three main phases, namely,

- (1) The planning and design phase
- (2) Construction phase
- (3) Operation and maintenance phase.

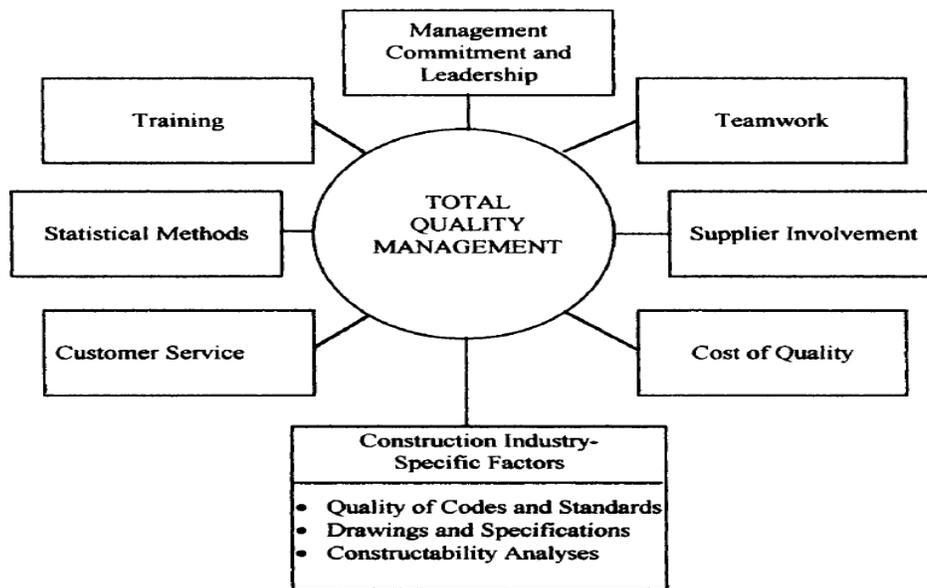


Figure 2.2: Shows the total quality management in the construction process (Arditi and Gunaydin 1997)

Management and Leadership

The study of the cost-effectiveness of the construction industry business roundtable concluded that the main cause of the decline in construction productivity directly or indirectly involves poor management practices (Burati et al., 1992). Since quality is part of productivity, the first step in management is to recognise the presence of a problem. The success of a TQM program depends primarily on management practices. According to Zubaira (2016), TQM is a culture and a philosophy that must spread through an organisation as management. This can only develop under the guidelines established by the TQM as the top priority. Thorough knowledge of the TQM must accompany this commitment. Only if it supports this commitment and understanding can the management lead the company to achieve better quality in their business.

Employee Training on Quality

Quality becomes everyone's responsibility, and the training must be targeted for every company level under TQM. There should be customised training plans for management, engineers, technicians, home and field office staff, support personnel and field labour (Smith, 1988). If TQM concepts become widely accepted throughout the building industry workers changing from one company to another should require less training since all the workers have received basic knowledge in quality awareness in their previous employment (Burati et al., 1992).

The training effort may include teaching the basics of TQM, analysis of causes and effects, solving team problems, interpersonal communication and interaction,

rudimentary statistical methods and cost of the measured quality.

Statistical Methods

Statistical methods provide tools to solve problems in the TQM process. According to Perisco (1989), they provide the team with tools to identify the causes of quality problems, to communicate in clear language that can be understood by all team members to verify, repeat and reproduce measurements based on data, to determine the past, present and to a lesser extent, the future stat of a work process and to make decisions on facts which are based on data rather than the views and preferences of individual or groups. The importance of statistical techniques is also underlined by ISO 9001.

Cost of Quality

The cost of quality is considered by both (Crosby, 1976) and (Juran, 1988) to be the primary tool for measuring quality. Their approach tracks the effectiveness of the TQM process, selects quality improvement projects, and provides cost justification to doubters. By making these simple installation costs of review, inspection, testing, scrap and rework, you can convince management and others of the need to improve quality.

According to Zubairu et al. (2016), quality costs include the cost of prevention, evaluation, and misappropriation. Prevention costs result from the activities used to avoid gaps or errors. In contrast, the assessment cost includes costs incurred for activities used to determine whether a product, process or service meets the requirements. For example,

the cost for design and constructability reviews and modifying work procedures to meet quality standards can be considered prevention costs. At the same time, the inspection is an example of an appraisal cost.

Supplier Involvement

Close and long-term relationships with these suppliers to the build process are required if the construction company is to achieve the best economy and quality (Oberlender, 1993). Normally, in the construction industry, contractors, subcontractors, and vendors are all pitted against one another to compete based on low-bid contracts. Yet, the fourth of Deming's recommendation in Arditi and Gunaydin (1997) recommendations for reaching a high level of quality stresses that companies must end the practice of awarding business based on price tag alone.

Customer Service

TQM is a process that requires global participation to be successful. This includes customer engagement. As more and more companies get involved in the TQM idea, and there is an increasing demand for improved quality, this concept becomes increasingly important. Customers can be internal or external (Palaneeswaran, 2006). Meeting the needs of these customers is an essential part of providing a quality product to the final external customer. Juran (1998) claims that the parties in a process (supplier, process, and customers) have a "triple role." However, Figure 2.3 illustrates the "triple function" concept applied to construction.

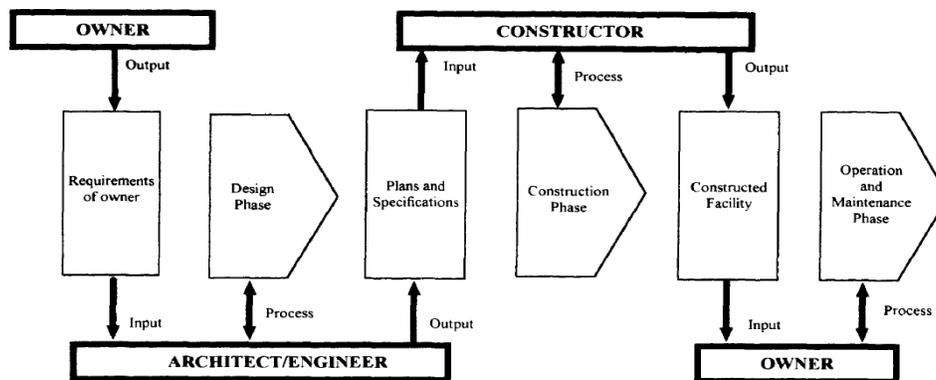


Figure 2.3: The concept of "triple function" applied to construction (Arditi and Gunaydin 1997)



Contractor

According to Yasamis and Mohammadi Arditi (2002) Quality contractor's performance measures are divided into corporate level in its adapted version of production and the project level measures including the most commonly used tools in the management of projects. Yasamis et al. (2002), Arditi (2003), Lee (2004), Ling and Chong (2005), Lee and Arditi (2006) carried out their research that corroborated the division of corporate level and project level quality performance. Quality performance at the corporate level is the process an organisation uses to achieve the following leadership attributes: employee empowerment, partnership information for the development and analysis, continuous improvement, client focus. These attributes have been identified as critical success factors to achieving total customer satisfaction for construction companies. In using these processes at a company, it may be possible for owners to predict if or not they will be satisfied with the quality of the construction company's performance. Regarding project-level quality performance, these are the tools, techniques, and processes used by an organisation to achieve product and service quality.

Quality Improvement in Construction

The general contractor delegates the responsibility for quality through contracts, and subcontracts. In the 1980s came the emergence of the construction management project delivery system in which construction firms appeared as entities not to be held accountable for design but only for performing managerial functions on behalf of the owner from the inception phase to the completion of the construction phase (Pheng and Hui, 2004). Construction management companies now did inspection and quality control that architects and engineers had traditionally done. The procedures in applying quality control should be put in bidders as part of a quality control plan. This will allow them to allocate the right cost to the testing procedure. According to Alexander (2008), quality improvement or enhancement, quality assurance (QA) and quality control (QC) are terms that are frequently used interchangeably. Because quality control is part of quality assurance while maintaining a clear distinction between them is important, it is also

difficult. Quality assurance is all the systematic and planned steps required to give the appropriate confidence that a structure, system or component will perform satisfactorily and comply with project requirements (Zubairu 2016). The quality control function is the closest to the product. The various techniques and activities are used to control the process and eliminate sources that lead to poor quality performance (Wick Veilleux, 2003). The quality assurance and quality control activities that are design-related are covered by a design organisation's standard office procedures. The responsibility of the designers or the construction management company is to evolve and keep an eye on the activities with the quality assurance program in the construction phase, depending on the project delivery system in use.

Improvement of Quality in Nigeria

The Federal Government of Nigeria and the States in Nigeria have different planning regulators. In the Federal Capital Territory (FCT), the Federal Capital Development Authority (FCDA) is charged with the regulatory authorities. It was established by Decree No. 6 on February 5th 1976, cited as the Federal Capital Territory Act. The Decree, which granted the ownership and control of all land in the area to the Federal Government, also gave FCDA the responsibility of handling design, planning and construction of the Federal Capital Territory.

Kado (2010) stated that although there are law and regulatory agencies and manuals, there are still gaps in the construction sector. Bamisile (2004) also noted that "in certain instances, unqualified persons prepare both architectural and engineering design and/or working drawings that are poorly prepared even in some cases without drawings number and the name of the designer or drawn by column completed not to talk about the name of the person that checked the drawings before they are issued for construction." Furthermore, some of the drawings are not coordinated, they are not suitable for construction purposes, specifications are not used, and more often than not, they are left to quantity surveyors to write. By and large, Bamisile (2004) notes that "one could say that the design team has not yet adopted any quality culture in their contribution to production of buildings in Nigeria."



METHODOLOGY

Approach Adopted for this Study.

This research was carried out using qualitative tools for data collection (questionnaires) to assess quality management practices in Abuja, Nigeria, with a focus on relatively small building construction firms. That is firms that are typically sole proprietorships and constitute a relatively small workforce usually not greater than ten (10).

This research adopted an extensive semi-structured interview of representatives from registered construction companies. The same approach has been applied in some other researches on the application and effectiveness of quality management systems in construction firms operating in the UK, Saudi Arabia and other countries (Lee et al., 2020; Trigunarysyah et al., 2021; Masuin et al., 2020; Rumane, 2017). But, by and large, this "structured interview" approach aligns properly with the aim of this paper (which is concerned primarily with discovering the perceptions and experiences of practitioners in the industry).

The selection of samples was built on the convenience sampling approach whereby sampling units are readily obtained (Lavrakas, 2008) from experienced engineers affiliated with a registered construction company.

However, to increase the validity of this study, certain standards are to be maintained. First, the construction firms involved with the survey must be registered with the Federal Capital Development Authority (FCDA) in Abuja, the capital city of Nigeria. Secondly, the people being interviewed must be involved in project management at the time of the interview. Although challenges related to getting consent from construction companies were encountered, the author managed to obtain a total number of eight (8) respondents. Moreover, some sample questions that were directed to respondents are presented in Appendix A-C.

RESULTS AND DISCUSSION

This section addresses the presentation and interpretation of data obtained from the field survey, data analysis, and findings discussion.

Profile of Respondents

All the interviewees' companies are registered with the FCDA in Abuja. The companies are generally construction companies for building works. The detailed profiles of the respondents are illustrated in Table 4.1.

Table 4. 1: Profile of Respondents

Respondent	Position	Years of experience
1	Project Manager	12
2	Project Manager	10
3	Project Manager	9
4	Project Engineer	4
5	Project Manager	15
6	Project Manager	10
7	Project Manager	13
8	Project Engineer	5

Analysis and Findings

All eight of the interview companies are ISO 9001 certified. One of the respondents said ISO is not a trend but a standard. To not lose out to competition, these companies have no choice but to be ISO certified. All the respondents, all from ISO companies, also affirmed that the system gives systematic guidelines for the execution of quality management. However, one of the respondents said that the ISO certification was mainly for marketing purposes. Regarding TQM (total

quality management), none of the companies currently practice it.

Nevertheless, all the interviewees insisted that the purpose of quality management is to fulfil their obligation under the construction contract rather than increase the satisfaction of their customers, which is the TQM philosophy. This made sense from a business standpoint because if the works do not meet the satisfaction of the inspectors, the work will have to be redone, which in turn brings loss to the company.



Quality Management Tools and Techniques

Based on the review of literature, a list of quality management tools and techniques was prepared for the interviewees. The list of tools and techniques is shown in Table 4.2. One of the objectives of this study is to show the level of relevance of the tools and techniques in the local context of construction management. From the list, benefit and cost analysis, cost of quality and inspections are the most common practices and it is used by all the interviewees. Besides benefits and cost analysis, cost of quality and inspections, no other tool or technique is common practice to all the interviewees.

Project quality plans, weekly site reports and work method statements are some of the tools and techniques that were subsequently revealed by the interviewees that were not prevalent from the review of the literature. A project quality plan is done based upon the request of the client or consultant. Weekly site reports are a good monitoring tool of site activities. And work method statements are used as guidelines for site operation. The details of quality management tools and techniques used by the companies represented are illustrated below.

Table 4.2: Quality Management Tools and Techniques Used by Construction Companies

Respondent	1	2	3	4	5	6	7	8	Total	Percent (%)
Benefit/cost analysis	✓	✓	✓	✓	✓	✓	✓	✓	8	100
Benchmarking	✓	✓			✓	✓		✓	5	62.5
Flow-charting	✓	✓		✓		✓	✓	✓	6	75
Designs of experiment	✓		✓		✓	✓			4	75
Cost of quality	✓	✓	✓	✓	✓	✓	✓	✓	8	100
Inspection	✓	✓	✓	✓	✓	✓	✓	✓	8	100
Control charts									0	0
Pareto diagram			✓	✓			✓	✓	4	50
Statistical sampling	✓	✓				✓	✓	✓	5	62.5
Trend analysis	✓	✓		✓	✓	✓	✓	✓	7	87.5
Quality audits			✓	✓					2	25
Any others mentioned	✓	✓	✓	✓	✓	✓	✓	✓	8	100

Management Commitment in Quality Management Implementation Leadership and participation

To obtain the level of leadership and participation shown by the top management of the respective companies, three questions were asked of each of the respondents.

1. Is the importance of meeting a client's requirements communicated by top management to the subordinates?
2. Does top management take charge in setting quality policies?
3. Are issues concerning project quality reviewed by top management?

Table 4.3: State of Leadership and Participation of Top Management in Quality Management

Respondent	1	2	3	4	5	6	7	8	Total	Percent (%)
Relay the importance of meeting client requirements	✓	✓	✓	✓	✓	✓	✓	✓	8	100
Setting quality policies	✓	✓	✓		✓		✓		5	62.5
Revision of project quality concerns	✓	✓	✓	✓	✓	✓	✓	✓	8	100

1. Regarding the first question, 100 per cent of the respondents answered "yes." So, it is clear that the top management of most companies stresses the importance of

- meeting the client's requirements (See Table 4.3).
2. Does top management take charge in setting quality policies?



Five out of eight of the respondents answered "yes." The response from two of the three respondents that didn't answer "yes" was that they do not sit in on those meetings. And one other respondent said top management delegates those tasks.

3. Are issues concerning project quality reviewed by top management?

Six out of the eight respondents answered "yes." All eight companies are ISO 9001 certified. Therefore, it is part of their requirements to conduct such reviews. None ISO 9001 companies might have to

go through external quality checks which might be paid for by the clients or consultants.

Allocation of Resources

To determine if the allocation of financial and human resources is sufficient for the application of quality management in construction projects, two questions were asked in this regard. If the interviewees representing their various companies answer "yes," this means that the allocation is not sufficient, if they answer "no," the allocation is sufficient.

Table 4.4: State of Resources Allocation of Top Management for Quality Management

Respondent	1	2	3	4	5	6	7	8	Total	Percent (%)
Pursue more financial resources	✓	✓	✓	✓		✓		✓	6	75
Pursue more human resources	✓	✓	✓	✓		✓		✓	6	75

Six out of eight respondents answered "yes" to both questions respectively. Furthermore, the first and second questions had identical answers. Those that answered "yes" to the first question also had the same answer to the second question. And those who answered "no" to the first question, also answered "no" to the second question. This made sense because the two companies' representatives who answered "no" to both questions are from relatively bigger construction companies. Companies that might be described as "more established."

CONCLUSION

In conclusion, based on the findings from the questionnaire, several points can be inferred.

1. Total quality management (TQM) is not common practice. The purpose of quality management is mainly for fulfilling their obligation under the construction contract rather than increase customer satisfaction as emphasised in the philosophy of TQM.
2. ISO registration is regarded marketing tool. However, one of the respondents lamented that one of the first questions clients ask is for the company's ISO certification.
3. The application of quality management is seen as a means of fulfilling contractual obligations and not satisfying the client.
4. With regards to quality management tools and techniques, construction companies

are using conventional methods such as inspections, cost of quality and design of experiments. In addition, the companies are relying on project quality plans, weekly site reports and work method statements.

5. Leadership and participation of top management in the aspect of setting quality policies could be strengthened. The reason is that, of the three questions asked during the interview with respondents, it was only "leadership and participation (in setting quality policies under top management)" that some respondents failed to affirm.
6. Finally, the allocation of financial and human resources to solve issues concerning quality management should be increased.

RECOMMENDATION

This research has made a modest contribution to knowledge as it has indicated that more companies should participate in sharing information to better quality standards nationwide. Recommendation for further studies will be to incorporate more small-scale companies to increase the sample size.

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