

The Factors Effects on Quality Management System in Construction

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ABSTRACT

Construction's requirement for quality management is now widely acknowledged. Implementing the quality standard elements in the field will be fraught with practical obstacles. And the majority of staff are enthusiastic. They are participating in this procedure without benefit. Appropriate method or standard for fixing the standards,

Quality assurance, quality control, and quality planning are used to define the quality management system (QMS). It is vital for the construction industry to certify that projects will be completed successfully and without hiccups. Highest quality, exact quantity, and lowest possible price. This essay intends to create a critical and constructive critique by examining five published works Publications pertaining to QMS in the building industry

The paper will investigate the variables influencing the deployment of quality management systems in building projects. Paper objectives were to identify crucial elements impacting QMS application, advantages that stimulate QMS implementation, and prerequisites or needs for QMS implementation. The study's purpose was to examine the successful major issues in the Quality Management System.

Keywords— Quality Management System, Construction, Job Satisfaction

prevention program. To achieve the desired level of quality as intended, it is necessary to adopt quality management methods across the whole project lifetime. outlined the repercussions of not adhering to and assuring the implementation of quality management systems throughout the project lifetime as follows:

- Design flaw
- Misinterpreting the design specification from the customer
- Applying inaccurate or out-of-date information
- Interpretation of client quality expectations
- Construction problems
- without constructing to specs or drawings and
- Careless management leading in sloppy work.

According to Harris and McCaffer (2002), total quality management (TQM) includes policies and processes that incorporate all of the efforts managers take to enhance their quality.

This includes:

- i. Quality preparation
- ii. Quality monitoring
- iii. Quality assessment
- iv. Quality enhancement

These are procedures for eliminating low quality from production, as opposed to eliminating poor quality products. This strategy requires every stakeholder to consistently improve quality to ensure customer satisfaction, to teach and re-train their employees, to gain the backing of senior management, and to provide a defect-free product on the first trying. (Further, Telsang, 2002) described the ideas as follows:

- Continuous improvement is never-ending
- Aim achieve development and

Participation of all employees in achieving the organization's customer satisfaction objective. While quality is addressed thoroughly and appropriately through a quality management plan, it leads to better efficiency since the plans are intended to use it:

- Standardize procedures
- Reduce waste
- Minimize repetition
- Enhance monetary profit.
- Drastically reduce the losses.
- Enhance work procedures

I. INTRODUCTION

Quality management in construction is a defining aspect that must be taken extremely seriously in all building projects. It is a comprehensive strategy to managing a project that assures effort to accomplish and enhance the needed quality for a well-planned and structured project that satisfies customers, delivers value for money, and is suitable for its intended purpose.

The quality of a construction product comprises of all of its qualities that enable it to perform a particular activity or meet a specific need for an adequate period of time.

According to Dada, Obiegbu, and Kunya (2016), quality management entails the actions of integrating all operations, procedures, frameworks, and products to achieve quality in the overall project.

Agbenyega (2014) defines quality as the pursuit of uniformity, whereas Bala, Keftin, and Adamu (2012) define quality management as a large-scale failure

- Increase job satisfaction and
- Enhance opportunities for a larger market share

Lack of quality delivery has increased despite the efforts of industry stakeholders to educate and train construction practitioners on the importance of adhering to the required standard of quality when carrying out their construction works in order to satisfy customers and provide value for money. Construction industry stakeholders.

II. THE QUALITY MANAGEMENT SYSTEM

A "Quality Management System (QMS)" is a collection of company practices designed to consistently meet and above customer requirements. It aligns with the organization's purpose and strategic aim "ISO9001:2015." It specifies the organizational aims and goals, strategies, processes, recorded documentation, and resources required for its execution and management. Early quality control approaches based on fundamental statistics and random sampling emphasized the predictability of industrial product outputs.

Throughout the twentieth century, worker inputs were frequently the most complex and expensive imports in most industrialized societies; as a result, the emphasis shifted to cooperation, particularly through early problem detection and a strategy of continuous development. In the twenty-first century, as investor loyalty and regulatory compliance requirements have grown, QMS has remained a vital part of attempts to improve efficiency and transparency.

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The "ISO 9000" typical family is probable "ISO 19011" audit regime is the most extensively applied QMS regime internationally; both deal with consistency and stability, as well as their incorporation into the system. Quality management may be built on a set of widely accepted fundamental ideas, standards, laws, and values known as "ISO 9000". "ISO, 2015c" It is a structure for guiding their companies toward enhanced performance. There are eight quality management concepts in ISO 9000:2005.

There are just seven quality management concepts in the ISO 9000:2015 edition (ISO, 2015c):

- Customer emphasis
- Management
- Employee involvement
- Process orientation

- Enhancement
- Making decisions based on evidence
- Relationship administration

Many "quality management systems (QMS)" have an emphasis on environmental issues and believe that systemic thinking, accountability, reporting, and analytic discipline will reduce other quality difficulties.

Guidelines for "Quality Management Systems" (QMS) "ISO 9000: Quality Management Systems-Principles and Vocabulary".



Figure 1: "Quality Management System"
Source: ISO 9001

III. ISO 9001 OR "QUALITY MANAGEMENT CERTIFICATION"

ISO 9001 is a standard that sets requirements that are intended to be relevant to all organizations, independent of their nature, scale, or provided products. The technical committee of ISO, TC-176, formulates all ISO 9001 standards (khatak, 2007).

The ISO 9001:2008 standard places a greater emphasis on client satisfaction by requiring its requirements to be met (Kuen and Zailani, 2007)."ISO 9001" does not describe the quality or "quality" objectives." filling the demands of customers" should be. Instead, it necessitates that companies set their own aims. Continually enhancing their methods to achieve their goals (ISO, 2015b). Most organizations use procedures to achieve their goals.

The International Organization for Standardization (ISO) defines a process as a series of connected or interacting actions that use inputs to achieve an intended result. The final outcome (ISO, 2015d). Both ISO 9001:2008 and ISO 9001:2015 are process-oriented, hence the two standards are quite similar.

The procedure purpose of this strategy is to improve an organization's ability and efficiency in meeting its objectives and the demands of its consumers. In addition, it helps businesses manage the connections between processes and their interfaces. hierarchy of the organization's functions (ISO, 2008). 9001:2008 includes the "PDCA" cycle and preventative action based on the identification and eradication of the causes of nonconformance.

ISO focuses on the underlying causes of issues (such as faults, flaws, and insufficient process controls) (ISO, 2008), whereas ISO focuses on the fundamental causes of difficulties (such as errors, defects, and inadequate process controls), the PDCA cycle and "risk-based thinking" are elements of ISO 9001:2015. An American quality management specialist named W.E. Deming initially introduced the "PDCA cycle". Planning, implementation, inspection, and processing make up the bulk of this cycle.

IV. CYCLE OF PDCA

4.1 Plan

Quality management begins with a well-thought-out plan. Measures and plans for achieving the objectives are established through the plan's quality management policy and objectives. Incorporation of quality management targets and work plans for quality control into the strategy. In lieu of quality concerns that may arise, the quality of frequent illnesses, the difference between quality criteria and national regulations or users' updates, and more quality requirements, the individual characteristics of the project govern the quality parameters that must be satisfied throughout construction.

4.2 Do

It is necessary to complete both the action plan and all construction activities in accordance with the plan's technique and specifications before it can be put into action. First and foremost, it need ensure that the strategy is well-planned and implemented. Technology and materials can also be implemented as part of the implementation process. Second, Companies depend on the quality assessment work system to verify that the quality plan is applied to all construction operations that comply to the plan.

Furthermore, the ideological work system must be relied upon in order to provide effective cultural education; the organizational system must be improved, the responsibility system must be implemented and rules and regulations should always be implemented; the product formation process quality control system must be relied upon in order to provide effective construction and construction quality control; etc.

4.3 Check

It is imperative that the plan, execution, and results of that plan's implementation be thoroughly inspected in order to identify any deviations or issues that may arise over the course of the inspection. Inspecting consists of two parts: In the first place, make sure the planned course of action has been carefully adhered to; in the second, ensure that actual situations have changed; describe the experience of successful implementation; and identify the causes why the strategy was not executed. A thorough evaluation and verification of construction quality is required to determine if it meets or exceeds the standards of the standard.

4.4 Action

Focuses on reviewing, validating, and establishing standards to encourage the use of successful knowledge as a basis for processing in upcoming work, as well as consolidating the outcomes; and taking efforts to correct differences in the execution of the plans, closing gaps.

Management of project quality through the use of the "PDCA cycle" Pre-construction quality management and decision-phase quality management is analogous to the "PDCA" cycle's first P link. Their roles and objectives are identical. All of them are gathering resources, drawing up standards and plans, and proving their viability. Essentially, it's a project's design phase.

If the designer is going to produce high-quality drawings, he or she has to gather all of the necessary information and communicate it to the client. D and C are the second and third linkages in the "PDCA" cycle. represent the q consist of a second and third linkages quality management in the building process. This connection is also used for construction-related activities including site control and inspection. This is akin to being in charge of a building site.

The primary goal of task and supervision is to identify and prevent issues with engineering quality. On-site processing is also essential in the event of a quality issue. The second and third phases of the "PDCA" cycle are considered in this content. The post-project quality management is comparable to the "PDCA" cycle's linked report It's for everyone's benefit. participating in project quality management assess and describe the quality of the project and express issues that may be resolved through dialogue in this link. The issues that arose can be used to improve project quality in the future. Incorporating the PDCA cycle within the project quality management information can allow its ongoing enhancement (Shen, L., 2004).

Thus, it is clear that the quality assurance system is operating in line with the PDCA cycle. A

quality of construction will improve by one step once it is implemented. The project's quality will suffer if even one of these links is broken. Because of this, these four ties are intertwined. Quality accidents are on the rise even as the building sector grows in our nation.

The field of engineering is an ever-evolving system. Unlike the manufacturing line, it doesn't share many of the same typical characteristics. As a result, quality management and control are made more difficult. To counter this, Quality management must be a priority for all stakeholders involved in the project. In order to boost construction quality. The quality of the design drawings, for example, must be considered from the beginning by the designer. As a supervisor, you need to ensure that the quality of your work is being closely monitored. When an issue is discovered, it should be addressed as soon as possible.

The material's quality should be ensured by the vendor before any orders are placed with them. Quality control is a responsibility that falls to the building team. To summarize, the PDCA cycle principle should be used throughout the project to provide the highest possible degree of project quality control.



Figure 2: “Quality management process “, source: ISO 9001

V. FACTORS AFFECTING ON QUALITY MANAGEMENT SYSTEM IN CONSTRUCTION

“Quality management system” implementation is affected by both success and failure variables, which may

be categorized into two categories. Success and failure factors must be identified in order to improve the quality management system application in construction businesses in order to discover the important features.

5.1 Factors That Effect Success

Implementation of a quality management system (QMS) relies on six key success criteria, according to Nursyamimi et al. (2014); these are: quality plan; commitment from top management; training and education programs, measurement and enhancements, collaboration, communication skills, and the use of information and communication technology (ICT).

5.1.1 Management of the Process

Construction projects necessitated the day-to-day activity of the organization on the construction site. As a result, quality management and quality control systems should be implemented to guarantee that the day-to-day activities are carried out consistently and reliably (Willar, 2012). As part of the quality management system (QMS), an organization has established and decided what documentation is needed to support each process. As a result, the project process management is formed for the purpose of consolidating the requirements and ensuring that the project is of the highest quality and meets the needs of the client.

5.1.2 Commitment from Top Management

Contractor and consultant are employed by the client to represent the organization's senior management in any construction project. At the start of the project, the customer plays an important part in decision-making and lays out the objective with the quality anticipated degree of achievement by players. With the client's support, building a quality management system is critical (QMS).

When it comes to quality management systems (QMS), researchers found that senior management's dedication has an impact as follows:

- The customer specifies in the contract that all parties participating in the ongoing building project must prepare and implement a quality management system (QMS).
- Programs and trainings linked to quality management systems (QMS) are organized by the client to raise awareness and comprehension of the project's QMS process and procedures, particularly for management- and foreman-level participants.
- Supported resources for QMS, such as cost budgets, engagement of the appropriate quality manager or consultant, and incentive for quality construction project achievement.
- The customer appoints members of the project team who are qualified and competent, and they

serve as the team's guides and mentors as they strive to improve the project's overall quality using the QMS.

- Clients must stress the importance of quality, employee safety and health, and environmental concerns.

5.1.3 Integrated Projects Quality Management

The Integration of the project quality plan is an additional success factor in the implementation of a quality management system (QMS). With the project quality plan integrated, an effort is being made to fulfill the requirements of project stakeholders, including the client, the consultant, and the contractor. Must integrate the duties and responsibilities of participants, encourage collaboration, and establish rapport with the customer. In addition to the technique, a quality expectation is associated with the objective and specification.

According to a research conducted by Kang and "Hwa (1994)", project quality plan integration for outstanding QMS applications has the advantage of reducing scope overlap and neglect. The project or operations and the quality debate.

These integrations are kept in place for properly complete, some practices stated by Abdullah must be followed Proceed as follows:

- Establishing ISO 9000-based quality plans for projects are the basis for these quality plans, and the contract criteria is essential.
- The project quality plan must be prepared and integrated by a qualified quality manager or consultant.
- The responsible authorities must be linked to the project quality plan in order to meet and balance the project's needs. The project quality plan specifies the roles and responsibilities of each party, mediates between management and contracting, and details the player's activities.

5.1.4 Education and Training Program

The concept of "QMS" lacks articulation adequately, and the construction sector lacks knowledge. Training and education programs about quality management system (QMS) implementation are a factor affecting QMS deployment. Due to misunderstandings and a lack of understanding, as well as a lack of dedication to quality system and programs, insufficient QMS Lack of training and instruction will result in unprofessional conduct and attitudes among construction workers. Following the teaching and learning of "QMS", the following practices should be followed:

- Awareness of quality and QMS fundamentals among construction industry participants will be a top priority for everyone involved.
- The overall quality of the work and the management team, down to the foremen, need to

be improved through the provision of QMS training.

- Organization of the work area into teams and granting access to the workforce for quality control both need detailed training specifications. The quality control circle is present at any and all stages to seek for opportunities to improve and encourage project organization training.
- Quality in project management may be improved by better training and education, which is facilitated by better resource management.

5.1.5 Performance Valuation and Improvement

Enhancing the quality system and reviewing its effectiveness to be able to sustain the criteria of the standard, that are assessed and analyzed to focus on customer happiness and client expectations, is essential (Asmonia, 2015), where they has been discovered that:

- Both internal and external auditors are employed to evaluate the quality of the QMS implementation and to identify areas in which it may be improved.
- Using the ISO 9000 audit records and reports, the quality manager or consultant produced the management review as intended to assess potential areas for quality improvement.
- The client was looking forward to the QMS's performance in granting the interim certificate and contributing to incentives.
- A construction project's success may be judged more accurately because of the expertise of the workers.

5.1.6 Collaboration and Communication Skills

Communication effectiveness and proficiency is the key to a successful QMS application. It is to be prevented that errors occur, such as transferring incorrect information, failing to convey the correct information, the wrong people receiving the correct information, the right people receiving the incorrect information, the correct information being delayed in being conveyed to the right people, a lack of communication skills leading to misunderstanding and an undesirable outcome.

In addition, the critical factors for good cooperation and communication are:

- Construct a structure of a steering committee comprised of all stakeholders involved, include the client and consultant team (consisting of an architect and a consultant engineer), and the contractor, in order to develop great objective and construct a schedule. Cohesion between individuals.
- Through excellent training and briefing, it is anticipated that a well-planned team structure would foster unity.

- Proficient communication between the participants fosters a strong, informal connection.

5.1.7 Information and Communication Technologies (ICT)

Using ICT provides a number of benefits, including the capacity to optimize and reduce document needs, facilitate quick access to information, and increase coherence with ISO 9000 standards. Several considerations must be taken into account while utilizing ICT in QMS applications, as listed below:

- Establishing electronic-based document for quality control by providing electronic copy of QMS and internet processes.
- QMS requirement and linkage to information technology For an information technology and the electronic document management system used to handle the data, the participants' desire, fundamental knowledge and comprehension, as well as their ICT proficiency, are crucial considerations.

Therefore, it is vital to give appropriate training and workshops in order to fight the shift in ICT management.

5.1.8 Impact Strategic Advancement Factor

For growing and achieving customer-satisfying product and service quality, the stumbling block that has emerged between customer satisfaction and competitive success must be resolved. Quality is a competitive approach that cannot be neglected from the strategic position. Significantly affecting the application of (QMS) in construction projects is the commitment of upper executives or upper staff to establish a strategic perspective and competitive advantage capabilities (Asmonia, 2015).

The QMS quality standard stresses the oversight using quality standards, process flow diagrams, and other documents created by the company's executive level, in addition to systematization. The strategic direction influences the relationship between a quality strategy, such as QMS, and the financial performance of the business as a facilitating element.

Therefore, to implement the plan, the management project manager must carefully develop and manage the QMS application. With a properly executed QMS, competitive and high-performance benefits are assured again for projects.

5.1.9 Effectuate Motivational Factor

Application of a quality management system (QMS), such as ISO 9001 certification, provides external and internal benefits. Teamwork, Elements that impact the quality management system include the company's internal performance and

communication, and its external performance and communication (QMS). Increasing customer satisfaction will also be a consideration to be considered by an organization that has implemented QMS. Moreover, the leadership style has the potential to alter the performance of QMS.

It is ensured that the QMS is supported by leadership styles that authorize and inspire team players. Other motivational elements driving the organization's implementation of this QMS application include increased profitability and a larger repository of practical information.

5.2 Construction Stage Focus of Quality –Influencing Factors

The factors affecting the quality of a building construction project are organized in this table into seven quality criteria (Tan, 1995) in the table (1)

Table 1: Factors influencing quality of a construction building project (JHA & IYER, 2006)

No	Quality criteria	Impacting factors
1.	Manpower qualified to achieve project mission, requirements, and objectives.	Capability of project manager Capability of design staff Capability of supporting staff
2.	Conformance to codes and standards.	Owner's willingness to abide by the agreed rules and standards. Utilization of the correct edition and articles. Consistency of the rules and standards.
3.	Conformance to owner's requirements.	Accuracy of owner's stipulated requirement. Clarity of owner's requirements. Changes to owner's requirements
4.	Conformance to design process and procedures	Completeness of engineering design manuals, and guidelines. The effectiveness of the quality control program. The enforcement of engineering change control.
5.	Conformance to schedule requirements	Monitoring and control of schedule and performance Number of engineering design changes Reasonableness of the schedule
6.	Conformance to cost requirements	Number of engineering changes Clarity of the scope of work and statement of work Reasonableness of the cost estimates and budget
7.	Completeness of and conformance to output standards	Completeness of data and information Clarity of illustrations and Classifications Consistency of the contents Accuracy of the data and methods

VI. CONCLUSION

As a result of this research, it is clear that quality management systems (QMS) for public construction projects must be developed urgently. An effective system would address the following issues: (1) a clear definition of quality in design criteria; (2) a focus on the final users and communities as the real customers for public projects; (3) resource allocation strategies for involving the latter and meeting their expectations; (4) learning cycles for the designers; and (5) changes

to the processes and cultures of interaction among the parties involved. Although QMSs themselves are not the goal of this study, this study underlines that quality standards and language in QMSs must be continually updated in order to be effective in practice.

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