



Applying ISO 9000 in Construction Industry in Iraq

Noralhuda M. Azize

Lecturer, College of education for girls, University of Thi-Qar, Iraq

ABSTRACT

Any project, particularly a construction project, has the danger of being exposed to several hazards during the project's life cycle. The quality assurance system of a contractor is crucial in preventing faults and problems. The International Standards Organization's ISO 9000 quality management standards are extensively utilized in the construction industry, as well as other businesses throughout the world (ISO). The use of this technology in the construction industry has recently gotten a lot of attention. Despite increased interest, the application of ISO 9000 by construction enterprises has not been thoroughly investigated from the perspective of developing nations. The characteristics of contractor businesses in the construction sector, as well as their perspectives, behavior, and experiences with the ISO 9000 quality management system in Iraq, are described in this article. The quality systems of ten building contractors in Iraq will be evaluated and examined in this article. The examination was carried out in accordance with the ISO 9000 standard. Contractors' quality systems are applied in a variety of ways, from a casual surface application to a thorough system application. The ISO 9000 provisions dealing with inspection and test status, inspection and testing, non-conformance product control, and handling, storage, and preservation are the most often followed. Design control, internal audits, training, and statistical methodologies are the provisions that have been the least adhered to. The bulk of contractors don't have much in the way of quality-control paperwork. In general, all ten Iraqi construction contractors agree that the ISO 9000 quality management system is advantageous to their companies and that it provides considerable benefits. ISO 9000 QMS, on the other hand, cannot be extensively accepted and implemented owing to practical constraints.

Keywords: construction, Iraq, quality management system, hazard, contractor

INTRODUCTION

Stakeholders have frequently denounced the Iraqi civil engineering projects as being of low construction quality. Building quality failure is a global problem, according to the conclusions of a quality research conducted by the International Federation of Engineers-Conseils on construction [1,2]. Because each undertaking has a certain amount of risk., In the engineering and construction industries, quality assurance is crucial. Quality is described in the construction



business as meeting the needs of the designer, contractor, regulatory agencies, and project owner [1]. The term "high-quality building project" brings up images of design clarity and application, regulatory compliance, construction economics, simplicity of operation and maintenance, and energy efficiency [3]. In the field of building, it is a regulation that projects must be completed on schedule, within budget, and to the appropriate quality level. In the construction industry, quality may be disregarded in order to save money and/or shorten the project's length. Quality assurance and quality control are used to check quality in the construction industry. Due to the large number and scope of construction projects in Iraq, prominent international construction firms have flocked to the country, resulting in fierce rivalry. Despite the fact that quality management systems are still relatively new in Iraq, particularly in the construction industry, big construction businesses looking for a competitive edge are paying close attention to the notion. From the standpoint of developing nations, the usage of ISO 9000 in construction enterprises has not been properly investigated. That is, only a few studies on ISO 9000 applications in the construction industry have included examples from poor countries. For this study, the ISO 9000 standards were utilized to assess the quality systems of 10 major construction businesses in Iraq. The conclusions of the evaluation are presented in this document. The level of execution, as well as the contractors' perspectives, are investigated [2].

ISO IN CONSTRUCTION INDUSTRY

ISO 9000 is a global standard that serves as the foundation for a quality management system that can be used to a wide range of sectors and businesses. It explains how a supplier may set up a quality system that demonstrates both a commitment to quality and the capacity to satisfy client demands[3]. The American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME NQA-1,)'s Quality Assurance Program Requirements for Nuclear Facilities, 1989, is based on ISO 9000 and is quite similar to it [4]. Quality management in construction is distinct from quality management in manufacturing and other service industries. The construction business comprises not just product quality, but also the overall management style required to suit the needs of designated clientele. According to Hoyle (1997), producing desirable quality products does not happen by accident, but rather requires the use of a quality system[5]. "Quality management" is defined by Lam et. al. (1994) as "that aspect of the overall management function that determines and implements the quality policy," and "quality system" is defined as "the organizational structure, responsibilities, procedures, processes, and resources for implementing quality management" in the construction industry [6]. The ISO 9000 series of quality management systems is the most often used by construction firms [5]. This standard is essentially a generic one that construction companies may successfully apply to various projects. Additional quality systems, standards, and awards include Six Sigma, the EFQM Excellence Model, and the Malcolm Baldrige National Quality Award Criteria. ISO 9000, on the other hand, is widely recognized in the manufacturing, industrial, and service industries[7]. Because it focuses largely on what firms should do to improve quality management and continuous improvement, this is the case. Although ISO 9000 standards are widely accepted in the construction industry, its use is not as widespread as it is in other industries, such as manufacturing. The construction business has unique characteristics



that make the ISO 9000 standard difficult to execute. Some of these characteristics are as follows [7]:

- While most construction projects are unique combinations of people, equipment, and materials brought together in unique locations under unique weather conditions, most manufacturing is a mass-production system in which all of these factors are consistent with producing typical products over and over again.
- In the vast majority of cases, performance testing as a foundation for building acceptability is not feasible.
- Separate contracts for design and construction are typical since it's hard to reject the entire finished project once it's tied to the buyer's land.
- Rejection decisions a faulty portion of a built project must be made quickly before the next set of pieces is built or installed.
- When it comes to the procurement of a constructed project, there are more parties engaged than when it comes to the purchase of produced items. Quality construction needs collaboration from all parties involved. In contrast to manufacturing, this complicates the interaction and responsibilities of a large number of people and groups.
- A construction company's organizational structure fluctuates based on the project's nature, but a manufacturing company's structure is virtually constant. This has an impact on the efficiency with which the responsible personnel communicate and interact.
- Because construction projects are complex and might take years to complete, workforce turnover is higher than in manufacturing, jeopardizing long-term planning precision.

The influence of ISO 9000 standards varies based on how businesses interpret them. It can be considered as a way to increase the overall quality of operations or as a sales strategy based on a higher-quality image [6].

LITERATURE REVIEW

The ISO 9000 standards have been in use in almost every sector since 1987. Customer-centricity and an in-house leadership environment are two of the system's key concepts. The ISO 9001:2000 certificate numbers are shown, the construction sector has surpassed it as the largest[8]. Unlike other businesses, the construction industry's goods and services are unique, meaning they are not duplicated. The commodities and services provided by each project have their own design and construction process, as well as their own process sequence and modules. It is typical to incorporate suppliers and subcontractors in these procedures to keep them operating smoothly[7]. This makes it difficult to define and implement projects and processes using prototypes and repeatable methodologies. Construction projects are also associated with a slew of problems. Local implications, environmental concerns, social reactions, cost, and completion time are just a few examples of consequences that should be considered throughout the design phase. All of this has underlined the need to look at whether the ISO 9000 is ever appropriate for construction companies. According to certain studies, the ISO 9000 is not suitable for construction firms. Based on interviews with 12 Swedish construction companies that held an ISO 9000 certificate in 2000, Landin (2000) [4] "contends that quality



management system requirements are overly abstract and difficult to implement. Despite the fact that increased competition is expected, particularly in the construction industry, and that as a result, the firm will begin to work more effectively, the industry is expected to struggle to meet its needs due to the diversity of processes in construction applications and the requirement to produce a unique product/service for each project, it is stated that the industry will struggle to meet its needs". Similarly, another study based on a questionnaire survey of ninety three construction companies in Singapore found that, Regardless matter whether they have ISO 9000 quality certificates or not, it is proven how ISO 9000 certification has been reflected in their implementation. The results show that certification has no effect on the quality management software used by enterprises or the product/service quality supplied [6]. However, some study suggests that the ISO 9000 is a useful tool for construction companies[6].

Pheng and Wee (2001) conducted a case study on this topic [9], "the effective implementation of ISO 9000 may minimize the flaws arising from the application of construction projects, as well as the prevention and repetition of errors. With the usage of this platform in a condominium project, the buildability rate has grown, the effectiveness has increased, and the costs have decreased. For these sorts of initiatives, it is stated that an adequate and acceptable work platform may be formed" [9]. For a variety of reasons, construction businesses get ISO 9000 certification. To satisfy their clients, engage the firm's resources, and manage the sought-after in-house quality procedures, construction businesses should strive for ISO 9000 certification. There are several building firms, on the other hand, obtain this certification at the request of their customers or as a requirement of the public tender authority. On the contrary, many firms use ISO 9000 certification as a tool to build a reputation and recruit new customers. Another research of thirty-three Hong Kong contractors who were ISO 9000 certified found that involvement in public projects as a requirement of their clients was the key reason for adopting the standard. [10]. The benefits of having a QMS for businesses, according to a study conducted by Ofori et.al (2002), "include the strengthening of the corporate image, the development of operation procedures, an increase in competitive power, an increase in output, increased communication among firm employees, and a reduction in material waste" [11]. In their study, Yates and Aniftos (1997) provide the findings of a comprehensive questionnaire survey done for US construction firms. As a result of the questionnaire, the enterprises mentioned safeguarding their worldwide market shares, the convenience of adding new projects, and having a competitive edge as positives, and higher workloads and expenses imposed by standardization as drawbacks [12]. There are conflicting perspectives on why ISO 9000 is important, as well as the benefits and downsides of utilizing it in the construction industry, according to A.M. Turk (2005)[13]. ISO 9000 QMS has been proven to be an effective strategy for decreasing material and labor waste in operations such as production and distribution, as well as enhancing profitability and market share in a variety of sectors. Furthermore, it is recognised that the offered product or service will be presented ideally as a consequence of certification to ISO 9000, which will raise the firm's marketing potential and market share while also enhancing its image. Benefits of ISO 9000 include enhancing the firm's operational processes, boosting productivity, raising the firm's self-confidence, improving customer satisfaction, improving supplier performance, and tighter controls on subcontractors.



In addition to goods and services, ISO 9000 certifies processes. The important factor to remember here is that if the procedures are well-managed, so will the goods or services supplied [10].

OBJECTIVES

The main objective of this paper is to examine the implementation of ISO 9000 Iraq construction companies, this includes implementation, the current practice ISO 9000 principles and elements, and barriers to effective implementation.

METHODOLOGY

Twenty significant construction contractors in various parts of Iraq were chosen for the study with the support of the Department of Construction and Projects. The chosen contractors were contacted and informed about the study's scope. Only ten contractors consented to take part in the study since they all had some sort of quality control system in place. The selection of 10 contractors was deemed sufficient for an exploratory research because this study used a nonprobabilistic sample. Table 1 shows the contact person's contractor number, years of experience, number of employees, specialization, and position.

Table 1 contractors background

Clause	Description	Clause	Description
4.1	Management Responsibility	4.11	Inspection measuring and test equipment
4.2	Quality system	4.12	Inspection and test status
4.3	Contract review	4.13	Control of nonconforming product
4.4	Design control	4.14	Corrective and preventive action
4.5	Document and data control	4.15	Handling, storage, packaging, and delivery
4.6	Purchasing	4.16	Quality records
4.7	Purchaser supplied product	4.17	Internal audits
4.8	Product identification and traceability	4.18	Training
4.9	Process control	4.19	Servicing
4.10	Inspection and testing	4.20	Statistical techniques

The review included personal structured interviews with key representatives as well as document inspection. Each interview lasted somewhere between three and five hours. A questionnaire form was used as a checklist. The first portion of the questionnaire is intended to collect information on the contractors' overall interest in and impressions of the ISO 9000 standards. The second portion examines the ISO 9000 provisions and poses specific questions about them (Table 2 lists the clauses). Contractors were asked if they have a quality system in place that satisfies each ISO 9001 clause, as well as if these procedures are documented and carried out.

Table 2 lists of the clauses

Contractor No.	Years in business	type of Construction	Position of contacted person
1	35	reinforced concrete and steel work	Projects Managers
2	30	electrical, piping, piping mechanical, structural steel	Projects Managers
3	18	buildings, mechanical, electrical, and HVAC	Projects Managers
4	16	buildings (schools)	Projects Managers
5	4	building, civil	Operations Engineer
6	5	roads, sewer	Operations Engineer
7	10	mechanical, electrical, civil	Projects Managers



RESULT AND DISCUSSION

Two of the ten contractors are ISO 9001-certified, three are expecting to get certified in the near future, and five have recruited outside consultants to help them create formal quality systems and prepare for registration. The other four contractors want to get registered as well, but not anytime soon. The ISO 9000 standards, according to the majority of contractors, are applicable to the construction business. Two contractors have worries about the guidelines' ability to improve the quality of building projects. These contractors did not make any exceptions to any of the provisions in the criteria that apply to their businesses. Table No. 3 indicates the proportion of organizations that have implemented ISO 9000 clauses, with the caveat that some clauses, such as clause 4.4 "Design Control", have a weakness in their implementation. When asked why this provision isn't used by any of the companies in the research sample, they claim it's because there aren't enough project allocations compared to what's needed. Existence of infringement on plots of land allocated for investment projects, which makes it impossible to implement the project due to the difficulty of the evacuation procedures, and clause 4.13 "Control of nonconforming product" was 5%, with the research sample's response that this clause is one of the most difficult aspects of the quality system because it requires the contractor's personnel to admit openly and in writing that they have done something wrong. As a result, the contractor may fail to tell the consumer. The nonconformance findings given by quality control workers are either disregarded or overturned by project engineers, according to certain contractors. This is due to the quality control personnel's lack of power (ISO 9001). Only a few people said the nonconformances were undocumented. All contractors agreed that clause 4.15's packing, preservation, and delivery requirements apply to non-construction materials. The top-ranked contractors demonstrated that the acquired project materials and equipment are handled appropriately and in such a way that their quality is not damaged due to improper handling, lifting, and rigging when they arrive on site or during construction. Also, that supplies and equipment are carefully stored before being used or installed in the project to guarantee that they are preserved securely.

Table 3 Percentage of implementation ISO 9000 in construction companies.

Clause	Percentage of implementation	Clause	Percentage of implementation
4.1	25.5	4.11	44
4.2	30	4.12	77.4
4.3	33	4.13	5
4.4	0	4.14	28



4.5	10	4.15	60
4.6	22.3	4.16	28
4.7	38	4.17	10
4.8	50	4.18	10
4.9	50	4.19	13
4.10	85.2	4.20	20

Interview identified various obstacles that discourage successful implementation of the ISO 9000 standard in constructions industry :

- Costly, particularly at the beginning.
- Change resistance exists at all levels of the organization.
- Workforce productivity loss owing to time spent learning and implementing the new system in addition to their usual responsibilities.
- Management interference
- Limited ability of personnel
- Remote job sites, making it hard to control and track the quality system implementation in all sites
- Communication problems between personnel because of language differences
- Cultural differences within the workforce

While the clause (4.10) was verified by 85 percent of contractors, it indicated that inspection and testing activities are done at all phases of the project, including receipt, storage, field fabrication, installation, and transfer to the client. Inspection and testing procedures define the quantitative and qualitative acceptance criteria for construction workmanship and materials, and the clause (4.12) found that 77.4 percent of contractors have well-documented procedures for determining the acceptability of construction items based on inspections and tests conducted throughout the construction process. This criteria applies to all materials, equipment, and building work that must be examined and tested. To differentiate between inspected and uninspected building objects, the contractors apply tags, markers, or routing cards. This sort of method safeguards against the use of inappropriate.

CONCLUSIONS

There is a misperception concerning the goal of the ISO 9000 standards. They think that all that is essential is a constant, low or high degree of quality, and that they should "write what they do and do what they write." This misunderstanding must be replaced with the correct concept of "plan-do-check-act," in which the quality system is examined and updated on a regular basis to ensure continual improvement and achievement of the organization's quality policy goals. The quality management systems of ten construction companies were examined. A quality system can be as simple as an inspection and testing system or as intricate as an ISO 9000 quality system. The most compelling reasons for registering are top management's aim to improve project quality and current or expected customer demand. The following ISO 9000 requirements are the most commonly followed: " inspection and test status; inspection and testing; control of nonconformance product; and handling, storage, and preservation". The quality system documentation, implementation methodology, and separation between nonconformance disposition and corrective procedures all had misconceptions. Establishing improvement priorities is another area where contractors fall short.



References

- [1] S. Gomez, "Influence of behaviors and psychological safety in improving quality management in construction projects.," *IGLC 2019 PhD Summer Sch. B. Ext.*, p. 24.
- [2] R. M. O'Maker, C. O. Aigbavboa, and W. D. Thwala, "QUALITY MANAGEMENT PRACTICES AMONG HOUSING CONTRACTORS: A LITERATURE REVIEW," *ICIDA 2013*, p. 103, 2013.
- [3] T. Y. Lee, H. K. N. Leung, and K. C. C. Chan, "Improving quality management on the basis of ISO 9000," *TQM Mag.*, 1999.
- [4] Landin A. ISO 9001 within the Swedish construction sector. Construction Management and Economics, London 2000; 18(5).
- [5] Hoyle, D. (1997), *QS-9000 Quality Systems Handbook*, Butterworth-Heinemann, Newton, MA.
- [6] Lam, S.W., Low, C.M. and Teng, W.A. (1994), *ISO 9000 in Construction*, McGraw-Hill, Singapore.
- [7] Leonard, D. (2010), "Quality management practices in the US homebuilding industry", *The TQM Journal*, Vol. 22 No. 1, pp. 101-110.
- [8] Quazi HA, Hong CW, Meng CT. Impact of ISO 9000 certification on quality management practices: a comparative study. *Total Quality Management*, Abington 2002;13(1).
- [9] Pheng LS, Wee D. Improving maintenance and reducing building defects through ISO 9000. *Journal of Quality in Maintenance Engineering*, Bradfor 2001;7(1).
- [10] Dissanayaka SM, Kumaraswamy MM, Karim K, Marosszeky M. Evaluating outcomes from ISO 9000-certified quality systems of Hong Kong constructors. *Total Quality Management*, Abingdon 2001;12(1):29.
- [11] Ofori G, Gang G, Briffet C. Implementing environmental management systems in construction: lessons from quality systems. *Building and Environment* 2002;37:1397-407.
- [12] Yates JK, Aniftos S. International standards and construction. *Journal of Construction Engineering and Management*, ASCE 1997;123(2):127-37.
- [13] A. M. Turk, "ISO 9000 in construction: An examination of its application in Turkey," *Build. Environ.*, vol. 41, no. 4, pp. 501-511, 2006.