FINAL THESIS

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Developing a Quality Management System According to ISO 9001:2015 Standards for Small Construction Companies in Syria

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INSTITUTE OF TECHNOLOGY
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DIPLOMA THESIS

worksheet

Issa Ebrahim *(QXK9N1)*

for

Title of the diploma thesis: Developing a Quality Management System According to ISO 9001:2015 for Small Construction Companies in Syria

Given laboratory process ….

Task reference:
The research is about developing a quality management system according to ISO 9001:2015 standards. A case study for a small construction company in Syria was also examined throughout the research to design the system and analyze its effectiveness. In addition, interviews were conducted to analyze the efficacy of the system on organizations. Finally, the research provides a bunch of proposals to assist in the implementation of the system.
Contributing department: Institute of Technology/ Engineering Management

Insider consultant: *Dr. Victor Medina,* MATE, Institute of Technology

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I approve		**Received**
(head of department)	(specialist coordinator)	(student)

As the external consultant to the thesis writer, I declare that the student has attended the pre-arranged consultations.

Date: Gödöllő, 2024_04_19

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1. Introduction

Aligning with global growth in recent years, heightened competition has come up among businesses, organizations, and industries that strive to enhance their best performance and guarantee their position in the market to achieve sustained success in the process. In recent years, organizations and firms have believed in quality management as an effective tool to enhance the organization's performance, increase customer satisfaction, and optimize the organization's performance and effectiveness. ISO 9001:2015 standards have succeeded throughout the years in providing organizations and firms with the opportunities to enhance efficiency, reduce errors and defects, and increase customer satisfaction while pursuing long-term success and a prestigious position in the market. Global and great companies, enterprises, corporations, and organizations have adapted the ISO 9001:2015 standards as quality management systems that suit the firm and optimize its effectiveness as a set of systematic approaches, practices, procedures, and policies that ensure products or services that are delivered by the firm constantly meet or exceed customer requirements to increase customer satisfaction, reduce errors during the general process, and enhance efficiency. These firms and organizations came from various sectors and industries. One of the industries that adapted the ISO standards methodology was the construction industry. This sector usually faces difficulties and problems due to a lack of management, which requires the use of ISO 9001:2015 as a powerful tool for reducing errors during the process, enhancing efficiency, increasing customer satisfaction, and improving employee involvement. However, many construction companies and organizations from different sizes unfortunately don’t care about management and quality during the process, which results in a bad impact on the organization, causing a big delay in the market and negatively affecting the financial situation and the environment in the firm. For instance, plenty of Syria’s small construction companies don’t follow any quality measurements during the general process of the company, which results in reducing the effectiveness of the organization by causing defects and errors in the implementation process, producing high rates of material waste, positively affecting customer satisfaction, and decreasing employee involvement in the process.

This research aims to manage the quality issues for small Syrian construction companies and solve the problem by developing a quality management system according to ISO 9001:2015 standards, which consists of principles, standards, procedures, and policies that function all together to ensure

a highly effective process for small construction companies in Syria and a high level of customer satisfaction. The research will demonstrate the positive impact of the ISO 9001:2015 standards on small construction companies through a literature review, describe the methods used to design the system and analyze its effectiveness, and show and describe the system with an analysis of its effectiveness in the result and discussion.

1.1. Research Objectives

- Reduce the rate of errors and defects during the implementation process in small construction companies in Syria.
- Reduce the rate of material waste in the process of small construction companies in Syria.
- Increase customer satisfaction at small construction companies in Syria.
- Increase employee involvement in small construction companies in Syria.

1.2. Research Questions

- What is the solution to the errors and defect problem during the implementation process in a small construction company in Syria?
- Which approach should be used to reduce material waste rates in small construction companies in Syria?
- What is the best way to increase customer satisfaction at small construction companies in Syria?
- How can we increase employee involvement in small construction companies in Syria?

1.3. Hypothesis

- Ensuring customers' involvement during the life cycle of the project and enhancing a connected and suitable systematic process approach, procedures, and standards by the system will reduce the rate of errors and defects by 80% during the implementation process.
- Developing a connected and comprehensive process approach, standards, practices, and policies within the system will reduce material waste by 60%.

- Involving procedures, standards, and policies in the system that ensure customer involvement during the processes will increase customer satisfaction by 80%.
- According to the strong connection between departments and procedures, standards, and practices that the system includes, the involvement between employees will increase by 50%.

2. Literature Review

2.1. Quality

Modern quality has a two-century history that involves several cultures, countries, and key historical events. The many persons and ideologies involved with the quality movement have molded the current state of quality management and quality engineering, as well as expressed the impact a quality-driven approach can make in producing a successful product (Hoover & Kolb, 2012). Quality is a word with several meanings. It is mostly used to express the customer's satisfaction due to using, purchasing, or trying a product or service. It is a word used to align with an organization's mission—to give outstanding quality to consumers (customers) and stakeholders. It is also a word used to describe several strategies for improving corporate performance (Juran et al., 2017). The term 'quality' consists of two meanings. The first is the specific or essential character, which is an authentic characteristic, property, or attribute that allows a product or service to be identified or characterized. The second relates to the excellence or rank of a certain product or service, which is related to customers or users who have tried, used, or bought them. The concept of quality in education combines both meanings (Kumar & Sarangapani, 2004).

2.2. Management

Management is the science and the art of accomplishing things through and with people in official organized groups, the art of establishing an environment in such an organized group where people may thrive as individuals while also cooperating to achieve group goals. The science of removing barriers to such performance and the art of maximizing efficiency in order to achieve goals(Furusten, 1999; Kaehler & Grundei, 2019; Koontz, 1961). During the history individuals stick to the same definition and define management as a method that enables organizations to achieve their goals by collaborating with and through individuals and other resources within the organization(Kaehler & Grundei, 2019).

2.2.1.Classical Management Movement

The "classical management movement" refers to the oldest and most recognized school of view among management practitioners. This management style started between 1885 and 1940 in an

attempt to offer a logical and scientific foundation for organizational management. Its origins may be connected back to the Industrial Revolution, when workers were brought together to work in manufacturers rather than the handicraft system, which included people working in modest enterprises or at home. Industrialization demanded effective planning, organization, influence, and control of all work processes. The classical management movement consists of two main tenets: scientific management and general administrative management. Scientific management focuses on strategies to increase production. Administrative management theory studies organizations as whole entities and focuses on strategies to improve their effectiveness and efficiency. The classical management movement has been recognized and lasted from 1895 to 1940. In recent years, classical management theory has been modified to be concerned with reducing costs, increasing productivity, and reevaluating organizational efficiency and effectiveness (Nhema, 2015; Pindur et al., 1995; Quatro, 2004).

2.3. Quality Management Systems According to ISO 9000

BSEN ISO 9000 (2000) defines a quality management system as a "management system to direct and control an organization in order to get extra value and quality." A quality management system's goal is to provide a framework of reference points to ensure that the same information, procedures, skills, and controls are employed and implemented consistently each time a process is conducted. This helps to create clear criteria, convey rules and procedures, measure work performance, and promote cooperation (Quality Management Systems Barrie Dale, 2014). Linking with the BSEN ISO 9000, quality management systems involve the activities required to include the organization's quality policy in handling, preparing, and controlling organization and product quality needs to fulfill stakeholder requirements such as functional, nonfunctional, and process(Alharthi et al. 2022). In general quality management systems refer to the systematic approach, practices, procedures, and policies implemented by organization to ensure that its products and services constantly meet or exceed customer expectations, it involves continues monitoring and improvement to enhance efficiency, reduce errors and defects, and increase customer satisfaction. Systems encompasses various activities like quality planning, quality control, quality assurance, and quality improvement (Kim-Soon, 2012; Oakland, 2014).

2.4. What is ISO?

Contrary to its name, ISO is not a normal international organization, it is surprisingly an international private network consisting of standards committees. Companies can establish their own standards; they can build the appropriate one to serve the organization. ISO has no power on companies and organizations to enforce them to be adopted. However, While ISO standards are generally optional, their implementation might become mandatory in reality. Many multinational corporations demand their partners and suppliers in supply chains to be ISO certified. ISO also has important connections to national governments and international organizations, which give it extra control over its standards. Governments can legally mandate ISO standards by adopting them into public regulations. In addition, (Dhanasekharan Natarajan, 2017; Heires, 2008; ISO 9000 Quality Systems Handbook-Updated for the ISO 9001: 2015 Standard, 2017). In general, ISO international standards are technical requirements for the structure, parameters, interoperability, or operation of objects and services; they outline how something should function or interact. Standards are intended to develop a common language between manufacturers, suppliers, and customers, even if no human interaction occurs. They define expectations and enable remote control of products and services. The codification and global acknowledgment of these standards enables interoperability, cheaper transaction costs, and economy scale (Heires, 2008).

2.5. ISO Family

2.5.1.ISO 9000

The transition from product standards to process standards, which began with the establishment of the ISO 9000 series on quality management in the 1980s, was a significant milestone in the ISO's extension of activities. ISO formed Technological Committee 176 ('Quality management and quality assurance') in 1979 and released its first standard in 1987 (ISO 9000 Quality Systems Handbook-Updated for the ISO 9001: 2015 Standard, 2017).Standards will inform suppliers and manufacturers about the requirements to implement a quality-oriented management system. The standards outline features and characteristics that should be included in an organization's management control system, including policies, manuals, and procedures, to ensure that quality is integrated into processes and achieved (Dhanasekharan Natarajan, 2017).ISO 9000 principles are applicable no matter whether a firm has ten or ten thousand employees. More than this, the

principles will be applicable and suitable for a variety of industries and organizations. It establishes the fundamental concepts and describes the methods and criteria for ensuring that the items leaving the plant, or the services provided match each customer's needs (Uzumeri, 1997).

2.5.2.ISO 14000

The ISO14000 family focuses primarily on management related to environment and supports organizations in decreasing negative environmental consequences caused by their operations while also continuously improving the way they handle environmental issues (Hasan & Chan, 2014; Hoyle, 2009). These standards are regarded as procedures rather than performance standards. By using this method, firms will not be given accurate results for their environmental productivity; instead, the ISO14000 standards will serve as guidance for organizations to comply with (Hasan & Chan, 2014; Stoss, 1996).

2.5.3.ISO 27000

Information Systems Management Systems, or ISMS, are a collection of rules and practices used by management to ensure information security in their regular business operations. It is based on how well a company conducts risk assessments and measures risk acceptance levels in order to handle hazards and weaknesses (Hamdi et al., 2019).

2.5.4.ISO 45000

The ISO standards are intended for a wide variety of risk management practitioners, both experienced and rookie, as well as those in charge of risk management supervision, who want to compare their risk management organization and operations with a recognized global standard (Dali & Lajtha, 2012).

2.5.5.ISO 9000 Series

2.5.5.1. ISO 9000

The standard introduces the essential concept and principles of the quality management system. ISO 9000 defines the keywords of the series on order to understand the whole series (ISO 9000 Quality Systems Handbook-Updated for the ISO 9001: 2015 Standard, 2017).

2.5.5.2. ISO 9004

Quality management system recommendations for improving performance. provides principles for continuous management system development (Stevenson & Barnes, 2002).

2.5.5.3. ISO 9001

It is a structure for quality management systems that is adopted to seek quality assurance in businesses whose operations encompass design, improvement, production, implementation, and maintenance. ISO 9001:2015 is an available tool for organizations to enhance efficiency, increase customer satisfaction, and reduce errors during the process, in other words, it is important for organizations to ensure that their products or services constantly meet or exceed customer satisfaction, and to ensure continual improvement (Abuhav, 2017; Ann W. Phillips, 2015; Dhanasekharan Natarajan, 2017).

2.6. Quality Management Principles According to ISO 9001

One definition of a "principle" is a fundamental concept, idea, or guideline that has a significant impact on the way something is done. The term "quality management principles" refers to a set of core ideas, norms, regulations, and values that are widely regarded as true and may be utilized to guide quality management. Principles can serve as a basis for an organization's performance enhancement. They were created and maintained by worldwide specialists from ISO/TC 176, which is in charge of establishing and maintaining ISO's quality management standards (Abuhav, 2017; Ann W. Phillips, 2015)Principles are:

- Customer focus.
- Leadership.
- Engagement of people.
- Process approach.
- Improvement.
- Evidence-based decision making.
- Relationship management.

Each principle should provide: a statement that describes and expresses the principle; Rational, which emphasizes the importance of applying the principle, Key benefits that show the benefits of

the principle, Action you can take refers to the common actions taken to increase an organization's performance while using the concept (ISO000 Quality Systems Handbook-Updated for the ISO 9001: 2015 Standard, 2017).

2.6.1.Customer Satisfaction

This principle in quality management is considered extremely important for organizations, as the top management should manage leadership and commitment while seeking customer satisfaction. In other words, the organization should develop systematic procedures in order to receive customer requirements, understand the requirements, and fulfill them to constantly meet and exceed customer expectations (Dhanasekharan Natarajan, 2017; Michael Biggs & Henrik Karlsson, 2011). Organizations should carefully receive customers' requirements by several methods to ensure satisfaction. Customers should consider part of the company as a stakeholder to enhance their satisfaction for continued improvement and effectiveness, because when customers' requirements are fulfilled, organizations will be able to design and produce products and services through a process with fewer errors and defects. (Milton P. Dentch, 2017).

2.6.2.Leadership

In the ISO 9001:2015 standards there is more emphasis on the areas of leadership, policy, leadership and commitment, and the organizational roles and responsibilities are viewed as leadership rather than management (Abuhav, 2017).

2.6.3.Engagement of People

Individuals at all stages are the heart of an organization, and their full participation allows their strengths to be leveraged to the company's advantage, according to this principle, No one's expertise and experience are confined to any stage of the process, it indicates that management should take advantage of these experiences and expertise, encourage employees to contribute, and use their own experience (ISO 9000 Quality Systems Handbook-Updated for the ISO 9001: 2015 Standard, 2017). Employee satisfaction might represent top management's view of the quality management system. Communication at all organization's processes and motivation are essential elements to fill the gap between top quality management and quality management system, resulting in continuous improvement for the organization (Zelnik et al., 2012). To be able to handle quality,

it is critical to understand the connection between management and employees inside the organization; it must be receptive. This implies that management must understand how to encourage people so that they see the value of their contributions to quality management. Employees are expected to accept the given encouragement, which will subsequently be reflected in customer satisfaction (via the QMS) (Krüger, 2001). Equality among employees at all levels. Discarding fear management fosters a high level of trust among employees, which benefits the organization's objectives (Welikala And & Sohal, 2008).

2.6.4.Process Approach

Every work is a process since it receives inputs and changes them into output. From an organizational perspective, such procedures provide quality input. As a result, processes must be effectively operated in order to generate the desired outputs. The process approach to management is consequently concerned with managing processes rather than just transforming inputs into outputs that match requirements. In other words, the process approach is about identifying requirements, doing everything needed to make them a reality, and determining the best method to meet these requirements, even if it involves altering how we perform what we do (ISO 9000 Quality Systems Handbook-Updated for the ISO 9001: 2015 Standard, 2017). The widely used process approach to evaluating the quality of goods and services is essential to the effectiveness of ISO 9001:2015 Quality Management Systems. In summary, "a process is a combined collection of operations that uses capabilities to turn inputs into outputs," and "process connection is very common because one process's result frequently acts as an input for another (Tricker, 2016). A process approach is a crucial prerequisite for setting up a successful quality management system. Every process within the company should be useful, interconnected, and well-coordinated to support the goals of the company and satisfy the demands of its clients. Consequently, the company must determine the sequence and interaction of each process. To ensure that these processes are managed and executed in an efficient manner, establish, and implement the standards and procedures needed to measure, regulate, and keep an eye on the related indicators of achievement. Determine what resources are needed for each procedure and make sure they are available. Assign authority and responsibility for these procedures, take into account the potential hazards and ways to regulate them, evaluate the procedures, and make any required changes to guarantee that they meet their objectives and goals (Heires, 2008; Milton P. Dentch, 2017).

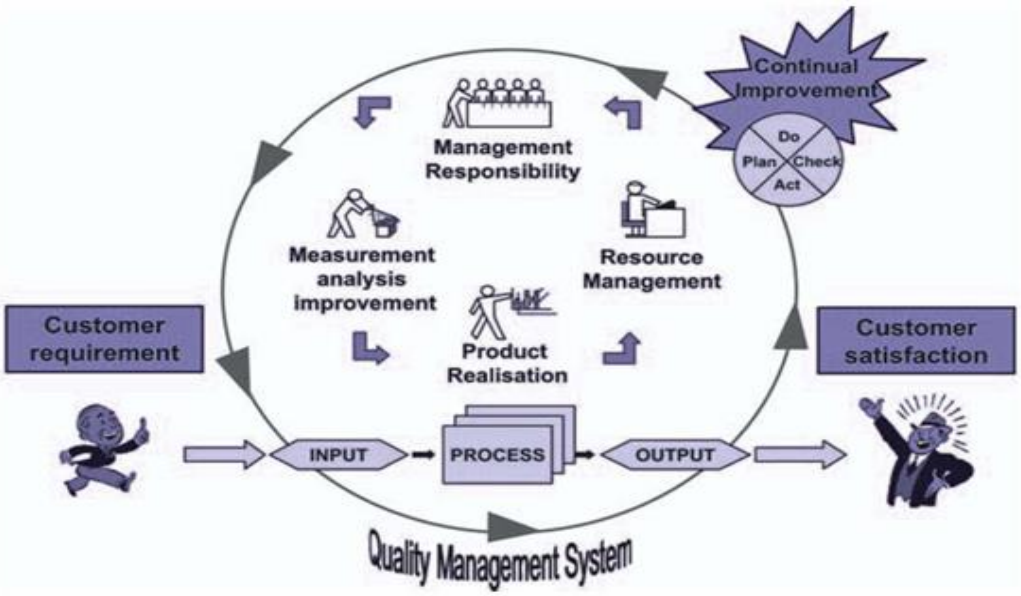
2.6.4.1. Process Approach Implementation

Seeking to establish an effective quality management system, the process approach should be considered an important requirement. All the organization's processes should be beneficial, connected, and coordinated in a way that serves the organization's objectives and fulfills customer needs. As a result, the organization shall:

- Identify the order and interplay of all processes.
- Establish and carry out the standards and techniques to track, control, and monitor the linked indicators of achievement required to guarantee effective execution and management of these processes.
- Identify the resources required for all processes and verify their accessibility.
- Provide responsibility and authority for these procedures.
- Consider the risks and possibilities in regulating these processes.
- Assess the procedures and make any necessary modifications to ensure that they achieve the expected output (Heires, 2008; Milton P. Dentch, 2017).

Figure 2-1: process Approach for Small Business According to ISO 9001:2015.

(Resource: Tricker, 2016).



2.6.4.2. Benefits of Process Approach

Because of the principle, the operations of quality management must be meticulously planned and executed. As a result, the firm may develop a successful service system to match client needs and achieve improved customer satisfaction (Chiu & Cheng, 2006). Building a quality management system with identified processes that can add value to the process approach, making sure these processes are connected effectively, and working all together in control to serve the organizational objective (Hajer et al., 2009).

2.7. ISO 9001:2015 standards and requirements

ISO 9001:2015 standard requirements are divided into 10 sections that unite to make sure that the organization's output fulfills the objectives, ensuring that the performance of the organization in all processes at all levels is always as planned. It also keeps adapting to the changing circumstances in the organization, reorganizing some of the data, in addition to risk management to enhance the implementation of the process approach, greater practicality for services, and enhanced leadership needs (Medic et al., 2016).

2.7.1.Scope

Organizations must clarify how they will consistently deliver products that satisfy customer and legal regulatory requirements, as well as their goal of increasing customer satisfaction through the efficient execution of the framework, including procedures for continuous system improvement and ensuring conformity with client and applicable legal and regulatory standards (Tricker, 2016). The organization's context, including the challenges it encounters both internally and externally and the needs of pertinent interested parties, must be taken into consideration when defining the scope of its quality management system (QMS), as well as the goods and/or services it hopes to provide. While the organization has always had to define the parameters of its QMS, it is now necessary to do so with special consideration for the goods and services it plans to offer, the company will define the parameters and areas in which the quality management system is applicable in order to define its area of application (Abuhav, 2017; WOLNIAK, 2019).

2.7.2.Normative References & Terms and definitions

Normative references give information about the reference rules or documents that are relevant to the specific standard, at the same time, terms and definitions details terminology and meanings relevant to the specific standard, as well as any formal connected concepts or standard (Tricker, 2016).

2.7.3.Context of the organization

Refers to the mix of both internal and external variables that might influence the organization's strategy for its products, services, and investments (Medic et al., 2016). Organizations must show that they have an approach in place to recognize, track, examine, and resolve any internal or external problems that are relevant to their objectives and may have an impact on their capability to fulfill the goals of their quality management system (Tricker, 2016).

2.7.4.Leadership

should be emphasized in all organization processes, aligning the quality management system, as demonstrated by a written statement outlining an organization's commitment to long-term quality management. Auditable evidence that all the customer's criteria are (and have been) completely satisfied (Tricker, 2016).

2.7.4.1. Quality Policy

A clear statement from the organization's senior management outlining how the company will fulfill its objectives and guarantee customer satisfaction while maintaining quality, the quality policy is considered an essential component of the system by ISO 9001. It is also a crucial part of the system as it establishes the framework for the company's quality objectives. Since the customer is one of the stakeholders, it repeatedly highlights the link between the company and its clients. (Milton P. Dentch, 2017; Purushothama, 2010). Top management is responsible for making sure the quality policy is in line with the goals of the company, has a commitment to upholding standards and continuously enhancing the efficiency of the quality management system, offers a structure for setting and evaluating quality goals, is clearly communicated, and understood throughout the company, and is periodically assessed to make sure it remains appropriate (Milton P. Dentch, 2017).

2.7.5.Planning

should address all potential hazards, including how, when, who, and what they may be. In other words, risk-based planning is probably the most significant demand for the new version of ISO 9001, and after an organization has identified the dangers and possibilities in their product or service, they must then determine when and how these hazards must be handled, as well as who ought to handle them (Tricker, 2016).

2.7.5.1. Actions to Address Risks and Opportunities

The organization should employ preventive methods such as risk assessments, trend analysis, statistical process control, fault tree analysis, failure modes and effects, and critical analysis to identify the reasons for possible non-compliance. To explain this, Organizations should identify hazards and possibilities that have the ability to influence the general functioning and efficiency of their QMS, both favorably and adversely. When an organization has recognized the dangers and opportunities it may face, it must decide how to deal with them. (Cătălina Soriana SITNIKOV & Claudiu George BOCEAN, 2015; Tricker, 2016).

2.7.5.2. Quality Objectives and Planning to Achieve Them

Top management is expected to document a series of quality goals that the organization must fulfill, notably in terms of product and service conformance and increased satisfaction with clients. The organization must create quality objectives at appropriate operations, stages, and processes for the quality management system. These objectives should be aligned with the quality policy, quantifiable, and meet applicable criteria. Ensure product and service conformance and improve customer satisfaction. Monitor, communicate, and update as needed (Hernawan et al., 2019). When the organization plan how to attain its quality objectives, it must decide the right action, what demand will be necessary, which individuals will be in charge, when it will all be done, and how the outcomes will be assessed (Kiran, 2017; Tricker, 2016). In other words, organizations must set quality objectives for the pertinent operations, levels, and processes required for the quality management system. These objectives must be identifiable, in accordance with the quality strategy, associated with improving client satisfaction and product and service conformance, tracked, communicated, and updated as needed. Top Management's expectations for quality outcomes across all organizational levels and functions. All staff members must be made aware of

these quality objectives at the time of planning in order for them to be readily translated into personal (and doable) contributions (Abuhav, 2017; Dhanasekharan Natarajan, 2017; Ralph L. Keeney, 2007).

2.7.5.3. Planning of Changes

When it is necessary to make a modification to the QMS, it must be done in a controlled way, and all suggested changes (i.e., operations, resources, obligations, techniques, processes, etc.) must be properly examined and approved by top management (Tricker, 2016).

2.7.6.Support

Organizations must analyze the resources necessary to achieve their aims and objectives, every organization should identify and provide the resources required to design, implement, maintain, and continuously enhance the QMS. Next, the organization shall decide and provide the human resources needed for the whole process, considering the constant improvement. Then, organizations shall define, offer, and sustain the facilities required for the functioning of its procedures and the conformance of its products and services. In other words, Top management determines and meets personnel needs. Process owners typically identify extra needs, and following a review, upper management provides the necessary resources (Dhanasekharan Natarajan, 2017; WOLNIAK, 2019).

2.7.7.Operation

Organizations must now not only make plans, execute, and supervise their processes in order to satisfy product or service demands, but also plan how they will deal with any hazards or possibilities that may influence these processes and, as a result, their capability to meet those needs. The realization procedures lead to the organization's goods and services. Considerations for product and service implementation should include intended outputs, operational phases, tasks, workflow, oversight procedures, training requirements, machinery, methods, data, supplies, and other resources. In fact, everything that may have an impact on the outcome (Tricker, 2016).

2.7.8.Performance Evaluation

Organizations should establish and specify what, how, and when things will be tracked, measured, investigated, and evaluated. performs internal audits to guarantee whether their management

system meets the requirements of the organization as well as the specified management standard. makes sure that the management system is properly installed and managed. organizes and performs management reviews to ensure that they are, and will continue to be, acceptable, sufficient, and effective (Tricker, 2016).

2.7.9.Improvement

It is commonly known that in a constantly changing corporate environment, not all things always go as planned. As a result, organizations should continually seek ways to resolve nonconformities and correct them, as well as recommend improvement plans, in order to not only satisfy customer needs but also increase satisfaction among consumers. In addition, organizations should keep recorded information as proof of the cause of the nonconformities, any subsequent actions taken, and the outcomes of any remedial action (Sih Damayanti et al., 2018; Tricker, 2016).

2.8. Importance of ISO 9001 quality management system in organizations and firms

Quality is a crucial and essential element in competition. Quality is a part of the international competitiveness report, which affects a country's progress towards a creative economy. ISO 9001 is one of the world's most widely used quality management standards. It has several advantages, which make it so common among enterprises. In 2010, over one million firms and organizations implemented a quality management system certified under ISO 9001. Europe and the rest of the world account for 86.4% of all ISO 9001 certificates (Europe 47.8%, Far East 38.6%). These areas are the most involved in quality management in terms of ISO 9001, which considers quality management as an important tool for improving operations, entering overseas markets, and boosting competition (Priede, 2012). The development of a QMS, that would assist enhance quality standards through the implementation of a risk-based strategy to the numerous ongoing activities, represents an essential challenge for the business. In this context, it becomes vital to use more creative and verified technology to ensure correct information management and risk control in order to provide increasingly dependable outcomes. In addition, ongoing QMS training is required to keep employees up to date and improve their actions inside the business. Furthermore, it provides extra value and potential for enterprises to provide exceptional and creative services and procedures to their clients (Franchina et al., 2023). The primary benefits of adopting ISO 9001

are the elimination of duplicate processes, decreased disagreements over procedures, and decreased resource needs (Zeng et al., 2005a).

2.9. ISO 9001 in construction industry

The companies' primary motivation for designing and implementing QMS is to effectively complete projects without significant schedule delays or budget increases. This scenario is frequent for construction companies in the early phases of implementing QMS ISO 9001 (Willar et al., 2015). A QMS provides benefits to construction organizations by avoiding duplicated processes, decreasing disagreement across processes, and decreasing resource needs (Zeng et al., 2005b). ISO 9001 helps construction companies to enhance their operations. In other words, while having differing philosophical approaches to quality, the organizations use ISO 9001 to improve their process control. In this manner, ISO 9001 functions as a direction, providing a set of standards to help businesses run their business activities. As a result, acquiring ISO 9001 certification allows businesses to optimize their operations (Budayan & Okudan, 2022). QMS may raise the company's level of service, which in turn raises customer happiness, shares in the market, earnings, and employee morale. As the projects are tracked as soon as feasible, the approach may really reduce wastage. It also improves the project execution phase because the QMS acts as an error prevention system, which directly helps the building industry by saving money and time (Samsudin et al., 2012).

2.10.Quality Management in Small Businesses

There are several intriguing findings and conclusions on adaptability and quality control in smaller businesses. The MBNQA performance criteria's most often employed methods (60–70%) were systematic gathering of information of business performance (revenue, expenses, and net profit); client happiness assessment; and quality-training courses. Furthermore, these procedures were thought to be the most beneficial to the company. the implementation of any high-caliber leadership techniques in the MBNQA Leadership class that are appropriate for managing small businesses in changing circumstances. When workers are subject to shared management and must absorb ambiguity, these procedures offer guidance (Kuratko et al., 2001). Quality management systems according to ISO 9001:2015 emphasize customer satisfaction, requiring small organizations to constantly exceed customer requirements and expectations by developing

approaches to understand their needs and involve them during the process, which results in enhancing customer loyalty, which is really needed for small businesses (Santos et al., 2019). In addition, quality management systems ensure quality and accurately during all processes, assess risks to prevent defects and errors during processes to enhance efficiency and performance of small organizations (Thomas H. Davenport, 2018).

3. **Methodology**

3.1. Research Design

Seeking to meet research objectives, The research uses a science-based methodology to design a quality management system according to ISO 9001:2015, and to be implemented in Syrian small construction enterprises. The design was created with small Syrian construction enterprises in mind, catering to their needs in the design, implementation, and sale of building products and apartments. The system was created using fundamental and key criteria according to ISO 9001:2015, which are considered as powerful tool to guarantee quality throughout the entire process. Also, a senior quality manager who has been an expert in construction quality field for over 20 years, contributes to this research by providing a full assistance to ensure useful and proper structure for the quality system. Additionally, the research uses a qualitative method to collect data from a small Syrian construction business to design the system and guarantee its efficiency.

3.2. Case Study and Problem Statement

For this research, a modest Syrian construction company was selected as a base to develop the system. The 15-year-old private corporation is called X Company. The corporation is regarded as minor in size. X Company is in Damascus, Syria, and offers its services throughout the entire city. It specializes in designing, implementing, and selling residential structures and apartments. The top management of the company is the owner, who is responsible for financial resources, selling and signing contracts, monitoring and controlling the company. The structural department and implementation department are responsible for designing, studying, and implementing residential construction according to Syrian regulations and standards. The logistics department does not completely exist in the structure of the company, as the owner deals with suppliers and takes responsibility for coordinating between the implementation department, warehouse, and suppliers to procure and ensure resources during implementation processes. The administration and support department ensures documentation, financial processes, human resources affairs, and communication between departments. The company has a warehouse where all the equipment, building materials, tools, and machinery are stored. The company's quality operations are carried out in accordance with primitive standards; most of these activities are the responsibility of the

department’s head, who collaborates with other departments' heads, including the top management, to complete the task. The owner, who represents the company's upper management, oversees both administrative and financial operations, including project funding and sales. The logistics department is in charge of resource management, which is within the purview of upper management. Along with upper management coordination, the implementation and the structural departments, along with the logistical department, are in charge of the design and the execution processes for projects. Only e-communications and scheduled meetings between departments and upper management are used for communication. There is little emphasis on the connection between the owner, client, and supplier. X Company is not considered a large or technologically advanced company but rather relies on primitive administrative departments to carry out the operation.

Because of the weak departments’ structure and the low-quality communications between departments, the company is facing bad situations. Due to the absence of quality during processes, the implementation process has 35% defects and errors, which negatively influences the financial performance of the organization. Also, the weak existence of the logistics department and the low level of coordination among the logistics department, implementation department, and suppliers cause a high rate of material waste which is about 40%. Moreover, the low emphasis on customers’ roles throughout the whole process of the company and the absence of customers during some important processes are reducing customer satisfaction, as the company is not reaching 60% customer satisfaction during the process. Finally, because of the weak coherent and cohesion connections among departments and the absence of the title job in the company, involvement between departments and employees is low and facing a bad situation. In general, all these problems influence a company’s performance, decrease its effectiveness, and have a negative impact on its financial performance.

3.3. Materials and Methods Used

The quality system was developed and designed according to the ISO 9001:2015 standards, with full assistance from a senior quality manager who has over 20 years of experience in the field of quality and construction. The manager is working in the company as one of the engineers who is responsible for the quality process. In fact, the expert manager has provided full assistance to guarantee that the quality system will be suitable for small construction companies in Syria. The

quality management system consists of methods, requirements, principles, and regulations that function together to ensure achieving objectives and goals of the company.

Methodology and Methods of the Design

The quality system consists of process approaches, practices, procedures, and policies that work together to enhance the efficiency of the company, increase customer satisfaction, reduce errors and defects during the implementation process, and increase employee involvement. The quality system consists of:

Quality Policy

According to ISO 9001:2015, the company needs to establish a quality policy to ensure alignment with ISO 9001:2015 quality standards and regulations, pave the way for the company to set quality objectives, reflect the mission of the company, emphasize customer satisfaction, and seek continual improvement. The quality system uses a mission statement, commitment to quality and customer satisfaction, top management's endorsement of quality objectives, and alignment with legal and regulatory requirements to ensure that the quality policy of the company is effective and comprehensive in order to enhance the company's performance and efficiency and increase customer satisfaction.

Quality objectives

Pursuing the best performance for the company, a set of quality objectives was established for the quality system. Objectives were set to serve the research objectives and to solve the company's problems. As a result, objectives will pave the way for the company to enhance effectiveness by reducing errors and defects during the implementation process, reducing waste, increasing customer satisfaction, and increasing employee involvement.

Scope

The organization, according to ISO 9001:2015, should establish a scope to demonstrate the company's activities, define the boundaries of the company, and describe the actions for which the corporation is not accountable. The scope consists of the company's activities and services, which define and demonstrate the activities of the company; the boundaries of the quality management system, which define all the areas that should be covered by the quality system in the company;

and exclusions, if any, from the quality management system that define unprioritized areas for the company. Because of the scope, the company can highlight the areas that should be covered by the system to make sure that the process is under monitoring and control, demonstrate the activities of the areas to attract customers, and outline the deeds for which the company is not responsible.

Process Approach

The process approach is a fundamental concept in ISO 9001:2015: assisting the organization to achieve its goals and objectives with high efficiency, defining the processes and activities and connecting them through strong communication methods, preventing risk, and seeking continuous improvement. The process approach consists of three main processes, which are the management process, the core process, and the support process. In order to support the process approach, a process map has been developed to represent the process approach and ensure all activities are defined and understood. In general, the company will be able to identify activities and processes, connect between activities, enhance better resource management, and measure and analyze data during a project to achieve continuous improvement.

Organizational Roles and Responsibilities

In full compliance with ISO 9001:2015, organizational roles and responsibilities have been defined and set for the quality system in order to achieve clarity and accountability, effective processes, and high-level communications within the company. An organizational chart has been defined for the company to clearly describe all positions that should be in the company, and a full job description has also been established to demonstrate all duties that should be undertaken by the company's employees. As a result of the organizational roles, responsibilities, and organizational chart, the company will be able to control employee performance in order to enhance efficiency, establish a title job to increase employee involvement, and make sure each employee filling a position in the company has full and proper knowledge about the position and its responsibilities.

Process Flow

During the design process of the quality system, two chart flows were created for the company to represent the general process of the company and the implementation process. Chart flows in both processes demonstrate all activities and processes during projects, standardize processes, define powerful connections between processes, reflect all the areas that could have waste during projects,

and reduce the risk. It is a powerful tool to understand all processes in the company and how they should be undertaken according to proper procedures to ensure effectiveness, reduce waste, and facilitate implementation processes.

Quality Assurance

Quality assurance is an essential element of quality management systems according to ISO 9001:2015 to ensure that products and services meet customer requirements and standards, both internally and externally within the organization. Quality assurance for the company clearly defines both company and customer responsibilities and uses a checklist to make sure that each process and activity is done according to quality and customers' requirements. Also, quality assurance for suppliers depends on three procedures: suppliers' selection, suppliers' management, and continuous improvement for suppliers. As a result of the company's quality assurance procedures, the organization will be able to monitor, control, and document all processes and activities undertaken during projects in order to achieve long-term success and continuous improvement. Also, the quality assurance procedures for suppliers will enable the company to control the performance of suppliers and make sure all the materials and services coming from suppliers are serving the company goals and objectives while meeting customer requirements in order to increase customer satisfaction and enhance efficiency.

Communication and Change Management

ISO 9001:2015 requires organizations to establish communication methods and tools to enhance effective communication between internal and external stakeholders. Two types of communication methods will be used in this system, which are meetings and e-communication, to ensure powerful communication channels between all stakeholders to avoid errors, engage stakeholders, predict changes, and increase efficiency. In addition, the system requires change management procedures to ensure sustained performance for the company in alignment with quality and success.

Non-Conformities and Corrective Actions

Pursuing alignment with ISO 9001:2015 standards, the company should establish methods and procedures to address non-conformities and corrective procedures to guarantee continual improvement, and it is required to develop a procedure to document all the non-conformities and

corrective actions during the life cycle of the project as lessons learned to enhance continual improvement.

3.4. Data Collection

- The whole system was developed according to the ISO 9001:2015 standards.
- Interview with the top management who is the owner and the senior quality manager to understand the structure and the problem of the company.
- Interview with a structural engineer, a field engineer, and the procurement specialist in the company to realize the environment of work in the company and understand the connections among employees.

3.5. Data Analysis

The data was analyzed by thematic analysis, a qualitative method to ensure identifying, examining, and summarizing all the important information from interviews.

3.6. Target Group

The developed system only applies to small construction companies in Syria that don’t follow and procedures for quality and specialized in design, execute, and sell small construction units.

4. Results and Discussion

According to the research methods and methodology, and with a high-level support process from the top management of the company mentioned above, in additions to group meeting with company's employees a quality management system according to ISO 9001:2015 standards has been developed to suite small construction companies in Syria. The system consists of set of methods, principles, and requirement, which with full integration able the company to enhance efficiency, increase customer satisfaction, reduce errors and defaults which considered as waste, and increase employee engagement to ensure long-term success and optimize the productivity.

4.1. Quality Management System Prototype

4.1.1.Quality Policy

A quality policy that complies with ISO 9001:2015 standards has been created for the company; it highlights customer satisfaction, pursues continuous improvement, represents the company's mission, and complies with legal requirements.

Quality Policy Statement

Our mission at X Company is to deliver high-quality residential flats after conducting a full construction study and design according to Syrian construction standards, prioritizing quality during all processes with excellent and perfect implementation to serve customer satisfaction.

Mission Statement

X Company's mission is to deliver high-quality residential flats after designing and implementing them, focusing on quality during all processes, to handover a high-quality construction product with the shortest time and least cost in order to fulfill customer requirements in all levels.

Commitment to Quality and Customer Satisfaction

X Company's employees are dedicated to delivering the highest quality products and services to fulfill our customers' needs and enhance their satisfaction. Our customers are the priority for the company, so we stay focused on improving our performance at all stages of the process to deliver an exciting experience for our customers.

Top Management's Endorsement of Quality Objectives

The top management of X Company highly supports our commitment to quality and cooperates with the system to apply our quality standards throughout the process. It provides our employees with the necessary resources, instructions, and control in order to maintain effective and excellent quality in all stages.

Alignment with Legal and Regulatory Requirements

Our company's activities are done in full compliance with the regulatory requirements, rules, and conditions of the Syrian construction industry. The quality policy of the company makes sure that the whole process is conducted with full commitment to the rules and instructions related to the Syrian government to ensure reliability and integrity in all projects.

4.1.2.Quality Objectives

According to ISO 9001:2015, the company's strategic orientation was supported by quality objectives that were established to guarantee ongoing improvement. The goals are well-thought-out, quantifiable, compliant with building codes and standards, and designed to boost staff engagement and customer happiness. The organization will guarantee long-term prosperity and improve effectiveness because of these goals.

Reduce the Rate of errors During the Implementation Process by 80%.

- Time frame: 9 months.
- Key performance indicators:
  - Number of mistakes after finishing every single process of the implementation.
  - Number of complaints from customers about mistakes.

Reduce Material Waste by 60%.

- Time frame: 9 months.
- Key performance indicators:
  - Weight and volume of the materials that wasted in every process.
  - Percentage of cost reduction for each project.

Increase Customer Satisfaction by 80%.

- Time frame: 9 months.
- Key performance indicators:
  - Survey with indicating scale.
  - Percentage of repetitions from customers and referrals.

Increase Employee Involvement by 50%.

- Time frame: 9 months.
- Key performance indicators:
  - Training courses.
  - Number of employees passed the course.

4.1.3.SCOPE

In accordance with ISO 9001:2015, the company's scope outlined all the areas that needed to be covered by the quality system. The scope lists the activities used by the business to carry out its quality system. In order to guarantee that priorities are fully addressed by the system, it also indicates the areas in which the firm does not support as well as the processes that it does not support.

Company's Activities and Services

X Company is specialized in delivering excellent services related to structural studies, the implementation of constructional residential units, and the sale of residential flats in Syria.

Our activities involve:

- Conducting fully structural studies for residential buildings according to Syrian regulations and engineering standards.
- Implementing and setting up the residential buildings in the field, including site preparation, foundation, framing, finishing, and exterior cladding with the lowest cost and shortest time and always heading to improve the process.
- Selling residential flats within the implemented buildings, offering high-quality apartments that meet customers' requirements and fulfill their desire.

Boundaries of the Quality Management System

The quality management system makes sure that every single process in the structural studies, implementation, and selling of the flats is aligned with the standards. This involves:

1- Top management (Owner).
2- Quality control department.
3- Structural department.
4- Implementation department.
5- Sales and marketing department.
6- Logistics department.
7- Administrative and support department.

The QMS is functioning only in Syria, where our projects are designed, studied, and implemented.

Exclusions, if any, from the quality management system

The system is designed to be comprehensive and cover all the process and activities related to structural studies, executing, and selling. However, some activities can be excluded from the scope of the company. Which are:

- Interior designing, cladding, and finishing in residential flats is the responsibility of the customer, and the management of the company is not responsible for it.
- Regulations and rules requirements related to interior designing, cladding, and finishing.

These exclusions have no impact on the company's objectives, as the company strives hard to meet customer needs and enhance their satisfaction throughout the life cycle of the project.

4.1.4.Stakeholders

In full compliance with ISO 9001:2015, stakeholders were identified for the company to ensure a full understanding of projects' requirements, develop effective communication channels, and increase customer satisfaction by identifying customers as stakeholders.

- **Internal Stakeholders**
  1- Top management.
  2- Quality control department.
  3- Structural department.
  4- Implementation department.
  5- Sales and marketing department.
  6- Logistics department.
  7- Administration and support department.
- **External Stakeholders**
  1- Customers
  2- Government: engineering syndicate, municipality.
  3- Suppliers: wood workshops, reinforcement steel workshops and factories, construction workshops and concrete factories, excavation and backfilling workshops.

4.1.5.Process Approach

The process approach consists of three main processes, which are management, core, and support processes. The management process of the company includes quality management processes, resource management processes, quality control and assurance processes, and improvement processes. Also, the core process represents designing projects, procuring and allocating resources for projects, executing and implementing projects, and finally selling the products to customers. Finally, the support process involves marketing, all the documentation work for projects, all the administration and support processes, and the warehouse processes of the company.

4.1.5.1. Management Process

- **Top Management Responsibilities**
  - Define quality policy: Our mission at X Company is to deliver high-quality flats after conducting a full construction study and design according to Syrian construction standards, prioritizing quality during all processes with excellent implementation to serve customer satisfaction.

- Top management support for the quality objectives: the top management of the company strongly supports our relationship with quality and strives hard to confirm that quality exists throughout the whole process.
- Alignment with Legal and Regulatory Requirements: Our company's activities are done in full compliance with the regulatory requirements, rules, and conditions of the Syrian construction industry. The quality policy of the company makes sure that the whole process is conducted with full commitment to the rules and instructions related to the Syrian government to ensure reliability and integrity in all projects.
- Providing financial recourses.

- **Resource Management**
  - Preparing the available resources needed for projects.
  - Procuring all unavailable resources for projects.
  - Monitoring and controlling the usage of the resources during the process of implementation.
  - Making sure that the consuming is according to plan.
- **Quality Management and Improvements**
  - Developing Key performance indicators (KPIs) to monitor and control quality and performance.
  - Ensuring each process in the plan is going according to quality.
  - Gathering data related to implementing processes, resource usage, and receiving feedback from customers.
  - Analyzing data for improvement.
  - Taking corrective actions
  - Documenting all the mistakes and difficulties that the process faced during the life cycle of the project and set corrective and preventive actions.
  - Striving hard to improve QMS and its efficiency.
  - Controlling employee performance including improving positions and bonuses.

4.1.5.2. Core Process

- Designing and planning
  - Receiving customer requirements and needs.
  - Conducting a full feasibility study for the project and risk management.

- Defining the scope, timeline, and budget of the project.
- Designing the architectural and structural plans for the implementation process.

- Allocating recourses
  - Preparing resources needed for each stage of the process.
  - Procuring all the materials, tools, methods, and services needed for the implementation.
  - Scheduling and supporting deliveries of supplies to project locations.
- Implementation and execution
  - Conducting Site preparation processes including excavation and backfilling.
  - Ensuring safety and full compliance with regulations.
  - Execute all structural elements according to plans and quality measurements.
  - Installing sanitary extensions for construction units.
  - Executing external cladding.
- Sales
  - Demonstrating the company's potential and services for possible clients.
  - Contracting and agreements.
  - Collecting documents, information, requirements, and demands from clients.
  - Closing sales and contracts.

4.1.5.3. Support Process

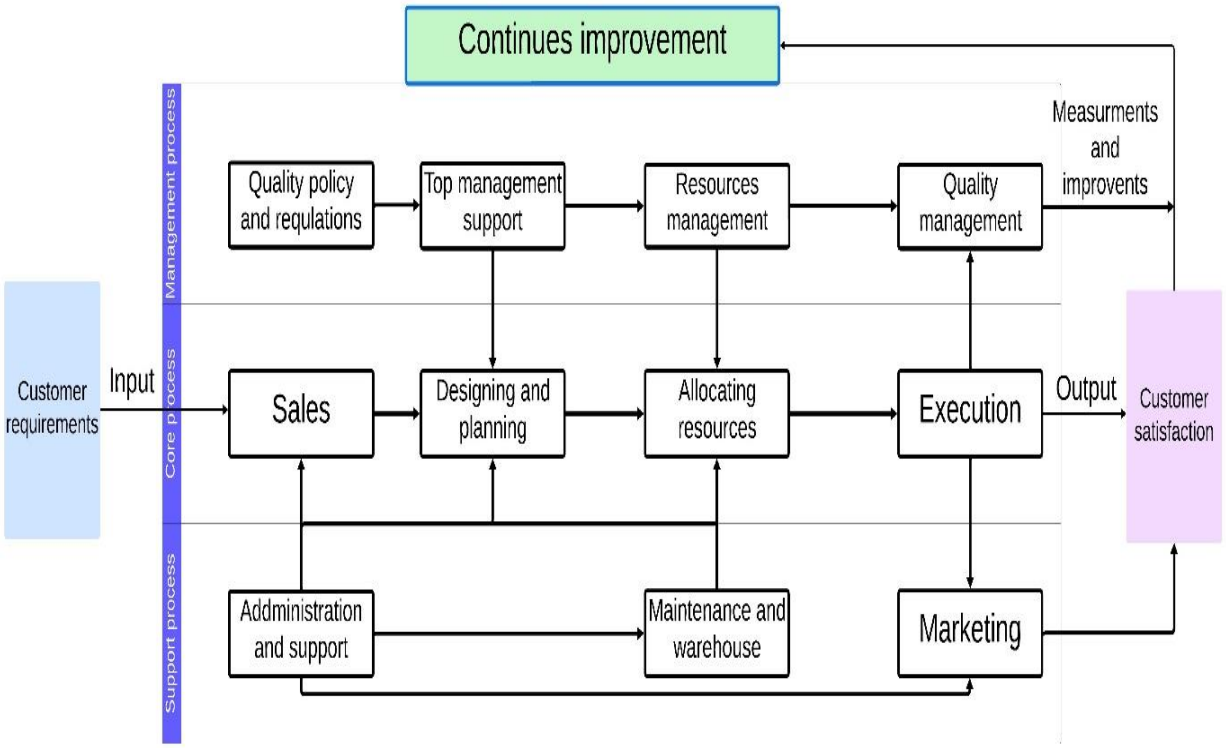
- Marketing
  - Conducting research on market trends and possible clientele.
  - High-quality marketing to express the high-quality product of the company.
  - Seeking new projects and opportunities.
  - Making surveys for customers' satisfaction.
- Administration and support
  - Handling all the financial work.
  - Monitoring the project cost throughout the life cycle of the project.
  - Managing all the documentary work and reports.
  - Managing recruitment processes.
  - Managing training processes

- Salaries processes.
- Documentation processes.
- Communications between departments.
- Define and set meetings.
- Maintaining devices in the company.
- Develop communication software to communicate between departments.
- Make sure everything is going according to law in the company.
- Training and preparing employees.
- Conducting training courses.

- Tool maintenance and warehouse
  - Keeping construction equipment and tools in the warehouse safe.
  - Conducting regular maintenance procedures for equipment.
  - Organizing and keeping the warehouse in the best situation.
  - Preparing resources for each stage of the implementation process.

Figure 4-1: Process Approach map of the Company.

(Resource: Own Work)



4.1.6.Organizational Roles and responsibilities

In accordance with ISO 9001:2015, organizational roles and responsibilities were defined for the company in addition to establishing an organizational chart for all positions in the company. As a result of the organizational roles and responsibilities and the organizational chart, the company will encourage responsibility and transparency, enhance good resource management, ensure everyone is performing according to quality, and establish a strong communication between company's members. Organizational roles and responsibilities form the basis of the organizational structure and support the company in achieving its goals and objectives.

Roles and Responsibilities

- **Top Management**

1. Owner

1.1.Introduce the vision, mission, and quality policy for the company.

1.2. Provide the company with financial resources.

1.3. Lead and direct the company.

1.4. Accept significant decisions and agreements (contracts).

- **Quality Control Department**

1. Quality Senior Manager

1.5.Prepare reports and provide it to top management.

1.6.Make sure stakeholders are up to date.

1.7.Always look for better processes and continues improvements.

1.8.Make sure everything is going according to quality in all processes.

1.9.Approve any changes and new procedures with top management.

1.10. Improve employees' positions.

1.11. Always measure and improve.

2. **Quality Juniors**

2.1.Receive data from departments.

2.2.Analise data.

2.3.Evaluate data.

2.4.Documenting and recording lessons learned.

- **Structural Department**

1. Senior Structural Engineer

1.1. Monitor and supervise the department and give reports to the quality department and the top management.

1.2. Distribute the duties between the department's members.

1.3. Review all the work that is done in the department and ensure that is in accordance with quality standards, And regulations.

2. Structural Engineers

2.1. Carry out full structural studies for projects according to requirements and regulations.

2.2. Conduct full study for resources needed to execution phase.

2.3. Deliver all the important information related to the structural aspects to the implementation department.

3. Architecture Engineer

3.1. Design and display the final drawings and photos for residential projects and structures.

3.2. Design posters for ongoing projects and provide it to marketing department.

3.3. Ensure high-quality designs for the apartments and buildings.

4. Draftsman

4.1. Provide structural engineers with engineering and structural drawings and designs.

4.2. Defines quantities of excavation and backfilling, quantities of concrete, and count the weight of the reinforcement steel.

4.3. Define apartment spaces.

4.4. Define building spaces.

- **Implementation Department**

1. Senior field Engineer

4.1. Monitor and supervises the implementation process and gives reports to the quality department and the top management.

4.2. Coordinate and distributes activities between project managers and site engineers.

4.3. Make sure that the implementation process is going according to plans, timelines, and standards.

2. Project Manager

2.1 Supervise and manage all the essential processes during the implementation process.

2.2 Coordinate between the logistics department and implementation process and prepare reports for senior field engineers.

2.3 Track the project budget and resource usage including preparing reports.

3. Site Engineers

3.1 Supervise and control the daily subprocesses during the implementation process.

3.2 Make sure that quality covers all the processes.

3.3 Prepare reports for the project managers.

- **Sales and Marketing Department**

1. Sales Specialist

1.1.Locate and attract potential clients.

1.2.Express the company's potential, services, and project to clients.

1.3.Arrange meetings regular meetings for customers.

1.4.Collect documents, information, requirements, and demands from clients.

1.5.Arrange meetings in case of changes.

1.6.Arrange and finalize sales contracts.

1.7.Receive complaints from customers and prepare reports for quality control.

2. Marketing Specialist

2.1.Execute research on the market to discover trends.

2.2.Create a marketing approach to highlight the company's services.

2.3.maintain the company's reputation.

2.4.Manage company's relationships.

- **Logistics Department**

1. Procurement Specialist

1.1.Locate and purchase materials, tools, and equipment required for projects.

1.2.Maintain supplier connections and ensure timely delivery.

1.3.Make sure that quality exists in all purchases.

2. Warehouse Worker

2.1.Keep construction equipment and tools in the warehouse safe.

2.2.Conduct regular maintenance procedures for equipment.

2.3.Organize and keep the warehouse in the best situation.

2.4.Prepare reports for the procurement specialist.

3. Coordinators

3.1.Manage logistics with the procurement, warehousing, and implementation departments.

3.2.Guarantee that requirements and equipment arrive at project sites in a timely manner.

3.3.Provide the quality department with quality documents, and reports for purchases and equipment.

- **Administration and Support Department**

1. Accountant

1.1.Take care of company's finances

1.2.monitor the projects' costs.

1.3.Prepare financial statements and reports for the top management.

2. IT Specialist

2.1.Develop a system for communication among departments.

2.2.Maintain the company's computers and software.

3. HR

3.1.Manage human resource functions.

3.2.Traini employees.

3.3.Evaluate employees and give reports.

3.4.Salaries procedures.

3.5.Assign activities and duties for employees.

3.6.Recruiter employee.

4. Lawyer

4.1.Gives legal guidance and maintains regulatory compliance.

4.2.Makes sure all the contracts are legal and safe.

4.3.All work related to building permits, official documents, and approvals.

Report Between Departments

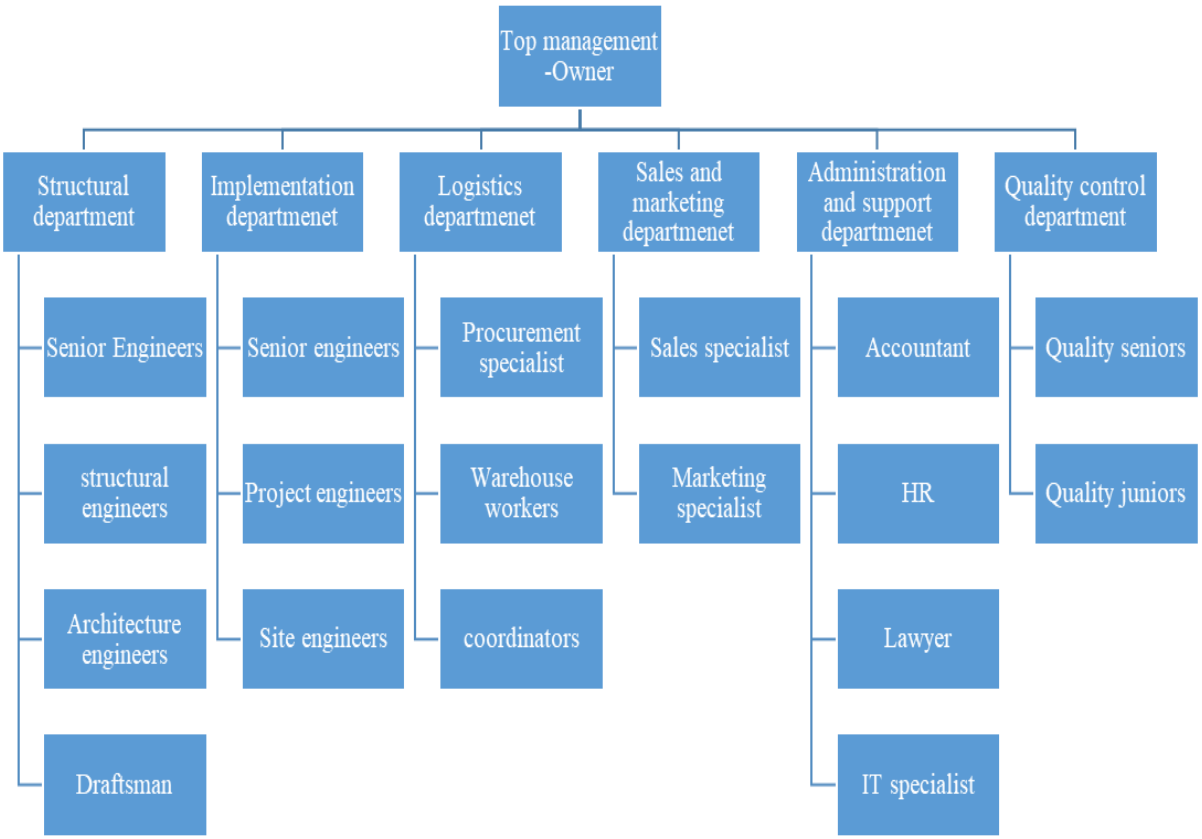
Top management is linked to all departments through the heads of the departments. The structural department is connected to the implementation department by the senior engineers. The logistics department is connected to the implementation department by the coordinators and senior field

engineers. The Administration and Support department is connected to all departments by HR. The quality control department is connected to all departments by the quality juniors.

Organizational Chart

Figure 4-2: Organizational Chart of the Company.

(Resource: Own work)

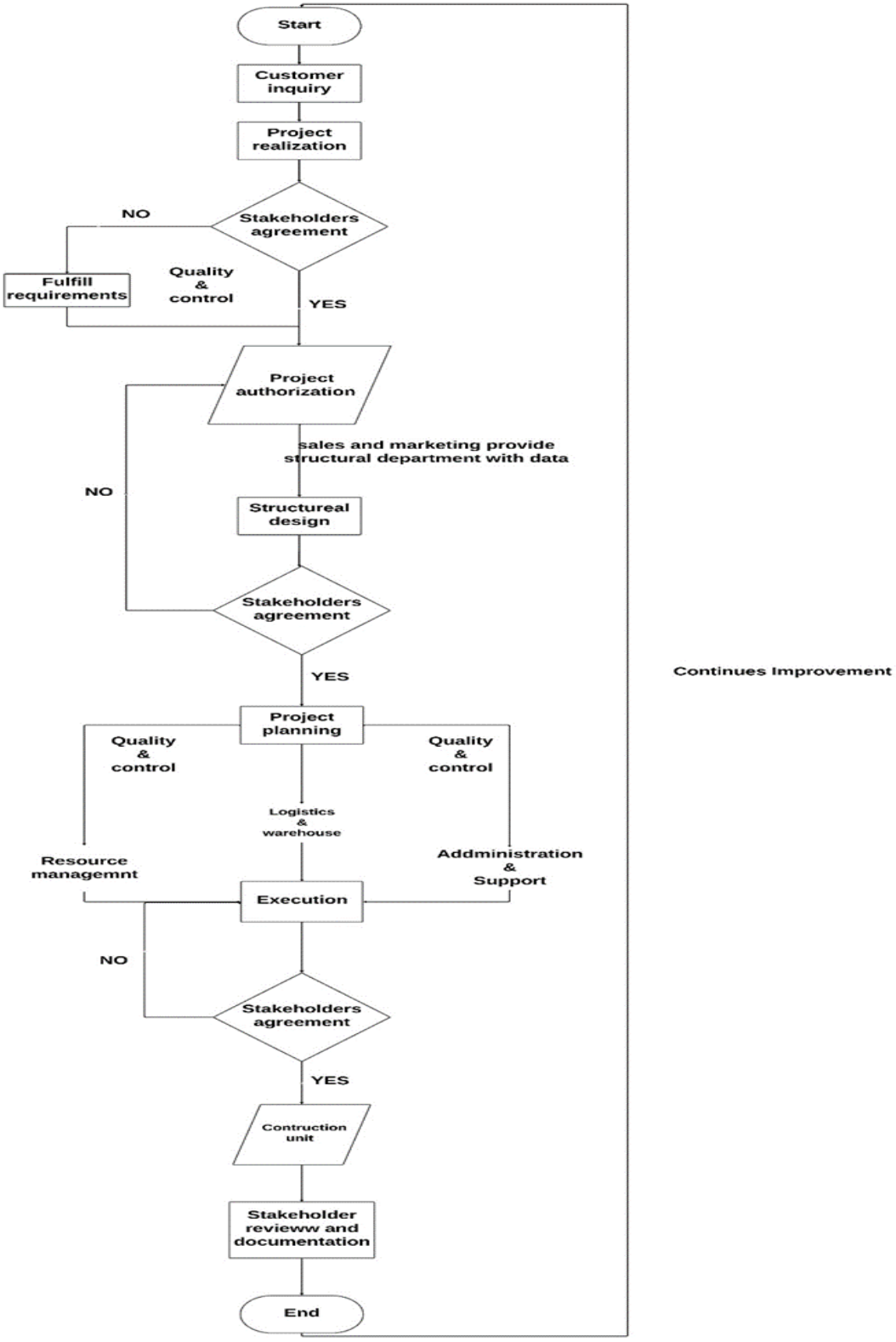


4.1.7.General Process Flow

The process starts with customer inquiries because of potential interest. The sales and marketing department and the top management declare the mission of the company, emphasize quality in all stages, and express the high-quality product the company delivers. Sales and marketing answer all questions for potential customers, write down all requirements in an official document to ensure quality, demonstrate the alternatives for customers, and show customers future projects and products to realize the project. After stakeholders agree on the project, the process moves forward to project authorization, where all the official documents, approvals, and project permits should be done and ready so the project can be legal, safe, and supportive to regulations and laws. Moving forward, the sales and marketing department provides the structural department with all customers' requirements; the structural department designs according to standards and regulations, studies, defines the resources needed, a timeline for the project, and a budget. Stakeholders should agree on the structural design to continue project planning, where logistics, administration and support, and resource management collaborate to guarantee that all the project requirements will be available for execution, taking quality into account for all processes. Next, the implementation process begins. After the implementation is done, stakeholders should agree on the executed parts during the implementation process life cycle, as a result the company will produce a constructional product ready to hand it over to customers. Eventually, the sales and marketing department conducts a survey with stakeholders, writes down everything in an official document, and provides it to the quality control department to continue improvement. During the whole process, the quality control department makes sure everything is going as planned through the connection with all departments, ensures that quality requirements are met during the process, and analyzes data received from other departments as feedback to evaluate performance, seeking continuous improvement. Also, the administration department makes sure each employee is in the right position, full of the required knowledge to accomplish the process regarding efficiency and effectiveness. In addition, the department conducts an evaluation process for the company's employees in order to ensure continuous improvement.

Figure 4-3: General Process Flow of the Company.

(Resource: Own work)

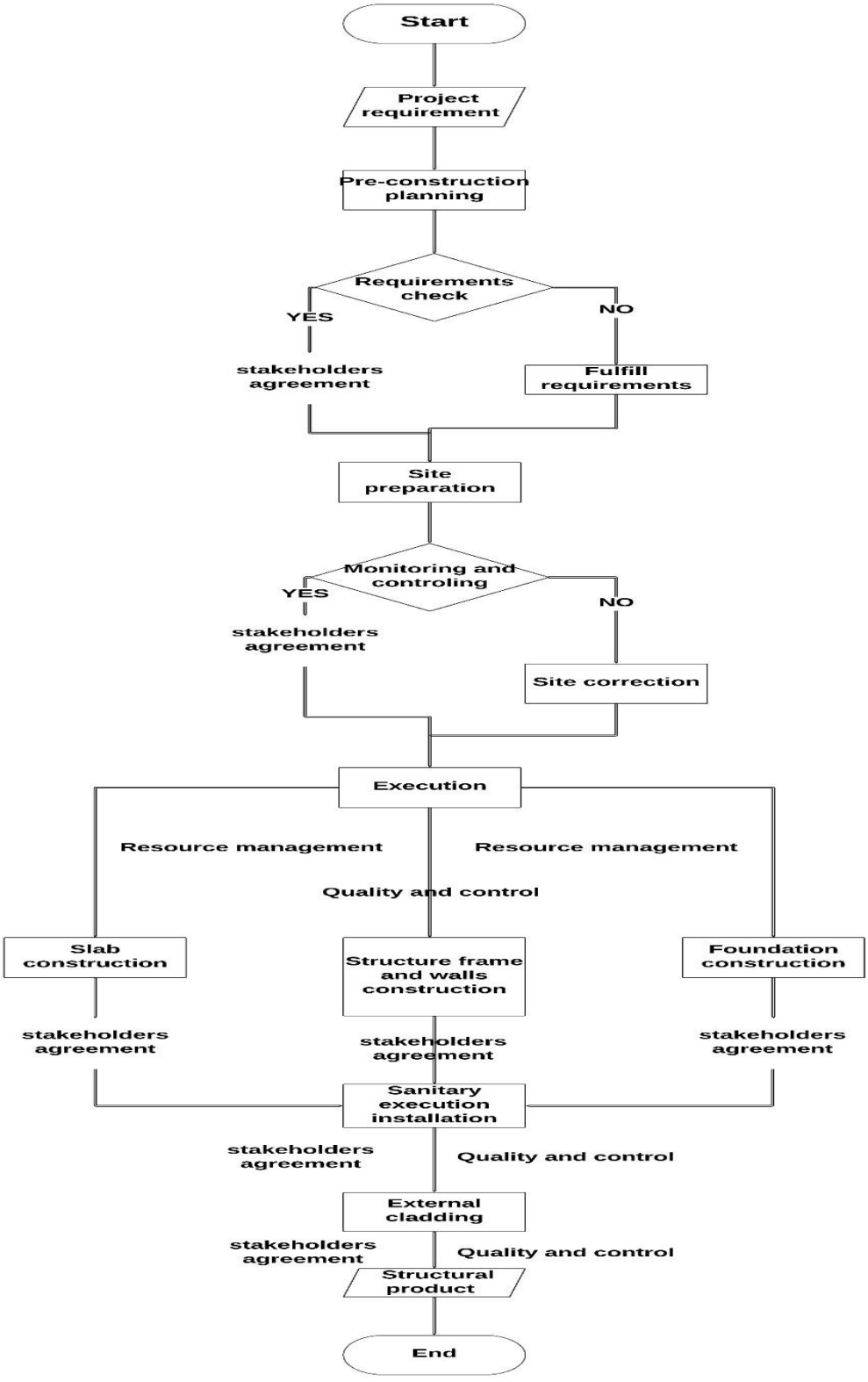


4.1.8.Implementation Process Flow

The implementation process starts when all requirements are defined and determined; the structural department provides logistics, administration and support, and the quality control departments with all requirements for the projects, drawings, equipment needed, quantities and qualities of wood, reinforcement steel, and concrete, as well as all requirements from customers. The logistics department define suppliers needed for the process, and HR assign responsibilities and training needed. The departments conduct a full study, considering all requirements from all parties involved to ensure an efficient execution process covered with quality. Following requirement fulfillment, the process proceeds to site preparation, where implementation and quality & control departments get the field ready to comply with rules and specifications, work with constructional designs that include backfilling and excavation, and keep stakeholders informed. The logistics, administration and support, quality control, maintenance, and warehousing departments work together to manage resource usage, ensure field transportation is operational, ensure that supplies and machinery moves proceed without incident, execute wooden work, reinforcement steel work, and concrete pouring, and finally keep stakeholders updated in all stages of the construction process taking into consideration all structural executions. This is the core of the process that begins after the excavation and backfilling are completed. Sanitation extension installation should begin when the construction execution elements are completed, adhering to all quality standards along the way, and keeping all stakeholders updated at every stage of the project's life cycle. The exterior cladding process, which is a minor procedure that pertains to the building's aesthetics and comes after the conclusion of the structural unit execution, is the last step in the process. The building will have stone cladding applied to its sides, windows, and staircase doors during the external cladding phase. Since it is a system process, it must be carried out in accordance with quality standards, plans, and stakeholder agreements.

Figure 4-4: Implementations Process Flow of the Company.

(Resource: Own work)



4.1.9.Quality Assurance

Aligning with ISO 9001:2015 standards and principles, quality assurance procedures and a checklist were established and defined for both customers and the company in all stages of the process. responsibilities were defined for both company and customers to ensure customer satisfaction, dodge errors and defects during the process, and guarantee every process in the project is done in full efficiency and according to regulations and standards. Also, the checklist provides the company with the opportunity to ensure a smooth implementation process, enhance consistency, optimize the training process, and ensure all stakeholders know their responsibilities and duties.

4.1.9.1. Customer Responsibilities

- **Pre-Construction Phase**
  - Define project requirements for the sales and marketing department to form the scope for the project.
  - Attend scheduled meetings.
  - Be available for meetings in case of changes.
  - Approve all permits, approvals, and authorization and except the timeline and budget for the project.
- **Construction Phase**
  - Be available for visits and communication to check the execution parts.
  - Approve all changes during construction, and materials used.
  - Cover the extra cost in case of changes according to his needs.
- **Post-Construction Phase**
  - Give feedback about the execution project.
  - Do a customer satisfaction survey.
  - Complete all the payments for the project.

4.1.9.2. Company’s Responsibilities

- **Pre-Construction Phase**
  - Sales and marketing ensure all customer requirements are reflected in the project scope.
  - Lawyer ensures all permits, authorizations, and approvals for the project.

- Quality control ensures quality procedures for the project and takes care of corrective actions.
- Designing and planning ensure all drawings, plans, budget, resources, and timeline according to quality standards and taking into consideration the regulations.
- Logistics ensure all resources are available and create a procurement list.
- HR distributes responsibilities and roles in addition to training, monitoring, and controlling workforces.

- **Construction Phase**
  - Safe and comfy site according to quality and regulations.
  - Execute the product with full compliance with standards, plans, and regulations.
  - Project completion according to timeline and cost.
  - Full project execution according to customers' requirements.
- **post-Construction Phase**
  - documentation for all lessons learned in order to continuous improvement.
  - Evaluate accomplished projects' data.
  - Develop a list of corrective actions according to lessons learned and data.
  - Receive customer satisfaction from surveys.
  - Sale the product to the customer by legal and authorized contracts.

4.1.9.3. Quality Assurance Checklist

Pre-Construction Phase

- **Project Realization and Authorization**
  - Official project scope from sales and marketing department confirms that the project requirements are defined according to client requirement.
  - Official approvals, permits and authorization documents from the lawyer, to align with country regulations.
  - Written approval includes permission from sales, clients, and top management to start project planning.
- **Project Planning**
  - Official approvals from the engineer's syndicate for the architectural and structural plans ensure that is according to the country's standard.

- Quality control procedures document from quality control department.
- Document ensures that the project's timeline and milestones were defined according to quality standards from the quality control department.
- Official document for the cost of the project according to quality from the quality control department, sales and marketing department, and the top management.
- A clear document from the logistics department about the availability of the project's requirements.
- An official document from the logistics department for the procurement of the project.
- A clear document from the HR department about the roles and responsibilities.

Construction Phase

- **Site Preparation**
  - Official document confirms the proper condition of the site from senior field engineer.
  - Official documents ensure that the field is according to country standards.
  - Official document confirms the safety condition of the site from site engineers.
  - Official document ensures the continues movability in the field for materials and equipment from project managers.
  - Official documents from senior field engineers and quality control ensure that the excavation process is done according to drawings, and quality procedures.
  - Official documents from logistics, implementation, and administration department about resources usage for the process.
  - Official documents from the administration and support department describe the cost of the process.
  - Official documents from quality control ensure quality during the process and document the lessons learned for continues improvement.
  - Official document contains corrective action from the quality control department.
- **Foundation Construction**
  - Official document confirms that the execution of the foundations is aligned with the timeline of the project implementation and quality control departments.
  - Official document describes the resource usage for the foundations during the process from logistics and implementation departments.

- Official document from quality control department ensures that the foundation execution prosses was done in full compliance with required and quality standards.
- Official documents from the quality control department describe the lessons learned for continues improvement.
- Official document contains corrective action from the quality control department.

- **Structural Frame and Wall Construction**
  - Official document confirms that the execution of the structural frame and wall is aligned with the timeline of the project from implementation and quality control departments.
  - Official document describes the resource usage for the structural frame and walls during the process from logistics and implementation departments.
  - Official document from quality control department ensures that the structural frame and walls execution prosses was done in full compliance with required and quality standards.
  - Official documents from the quality control department describe the lessons learned for continues improvement.
  - Official document contains corrective action from the quality control department.
- **Slab Construction**
  - An official document confirms that the execution of the slabs is aligned with the timeline of the project from implementation and quality control departments.
  - Official document describes the resource usage for the slabs during the process from logistics and implementation departments.
  - Official document quality control ensures that the slabs execution prosses was done in full compliance with required and quality standards.
  - Official documents from the quality control department describe the lessons learned for continues improvement.
  - Official document contains corrective actions from the quality control department.
- **External Cladding**
  - An official document confirms that the execution of the external cladding is aligned with the timeline of the project from implementation and quality control departments.
  - Official document describes the resource usage for the external cladding during the process from logistics and implementation departments.

- Official document from quality control department ensures that the external cladding execution prosses was done in full compliance with required and quality standards.
- Official documents from the quality control department describe the lessons learned for continues improvement.
- Official document contains corrective actions from the quality control department.

- **Quality Control**
  - Official document ensures all stake holders approval during the product life cycle.
  - Official documents describe the lessons learned in all stages for continues improvement.
  - Official documents admit that quality covered all processes during the project.
  - Official document for corrective actions.

Post-Construction Phase

- **Unit Handover**
  - An approval from the client about the executed project (the client's requirements have been fulfilled).
  - official papers stating that the customer has deserved all payments from administration and support department.
  - A Signed contract between the top management and the client for handing over.
- **Customer satisfaction survey**
  - Official satisfaction survey from sales and marketing department.
- **Continues Improvement**
  - Official document includes the lessons during the life cycle of the project from quality control department.
  - Official documents include all the corrective actions from the quality control department.

4.1.10. Communication and Change Management

According to ISO 9001:2015, communication tools and methods have been developed for the company, and internal communication has been defined to ensure effective communication among all departments in the company, prevent misunderstandings between departments, and ensure everyone in the company is informed of the process's information to prevent errors and defects. In addition, external communication tools and methods have been defined for the company to make

sure that all stakeholders are up-to-date and know everything about projects. Moreover, in the case of change management, a procedure has been developed for the company to ensure quality during the change process, define the causes of the change, and ensure proper responsibilities for stakeholders in the event of a change.

4.1.10.1. Communication

- **Internal communication**
- **Meetings**
  - Weekly meetings between sales, structural, implementation, administrative and support, and logistics departments and the top management (company).
  - Daily meetings in each department.
  - Regular meetings Between HR and head of departments.
- **E-Communication**
  - Groups on WhatsApp.
  - software of the company.
  - emails, and calls.
- **External Communication**
- **Meetings**
  - regular meetings between the customer, sales, implementation, and the top management.
  - Regular meetings with stakeholders and the top management.
  - Weekly meeting with suppliers.
- **E-Communication**
  - WhatsApp.
  - emails, and calls.

4.1.10.2. Change Management

In case of changes, the information should be sent first to WhatsApp groups to all related parties, after this, an argent meeting should be arranged for all related parties to discuss the situation; and any change in the process should be upon all parties' agreement and the top management. The execution phase of the changes should have timeline, budget, and resource management, as it

follows the same procedure as the quality management system. The whole process should be monitored to ensure quality.

4.1.10.3. Specifications of Changes

If the changes in the plan were due to an error on the company's side, then all the changes in cost will be the company's responsibility. If the change in plan was according to the customers' intention, then customers should be responsible for the change in cost.

4.1.11. Quality Assurance for Suppliers

To ensure the quality of all materials, equipment, and supplies, a quality assurance system for suppliers has been developed according to ISO 9001:2015. The procedures ensure that all suppliers are compatible with the process, all materials are according to standards and quality standards, and according to the procedure, customers can define their needs for suppliers to make sure that all materials and equipment fulfill the project requirements, customer requirements, and quality standards.

- **Supplier Selection**
  - **Pre-Approval Procedure:** the Quality and control and the implementation department should conduct full procedure to ensure that all suppliers are qualified for the process.
  - **Supplier Investigations:** the company should regularly conduct an audit process for suppliers, quality control procedures.
  - **Documentation in Contract:** the company should document requirements needed from suppliers, non-conformities, and quality requirements in the suppliers' contracts.
- **Suppliers' Management**
  - **Clear Communication Channels:** the company should set communication channels with suppliers to inform them about requirements, quality needed, and delivery schedules, which is the logistics department's responsibility.
  - **Information Flow:** meetings between related stakeholders should be established regularly, in addition to e-communication.
  - **Quality Monitoring:** the company should monitor the attitude of suppliers, like on-time delivery, quality of materials, and non-conformities.

- **Continuous Improvement**
  - **Feedback from suppliers:** the company should always get feedback from suppliers to identify areas of improvement.
  - **Develop Suppliers' Programs:** the company should always improve programs with suppliers to ensure the best offers and quality for the process.
  - **Gathering Stakeholders:** the company should introduce suppliers to customers to enhance customers satisfaction and fulfill customers' requirements.

4.1.12. Non-conformities and corrective actions

Pursuing controlling and managing unexpected situations during the company's process, non-conformities and corrective action procedures were established for the company in accordance with ISO 9001:2015. These procedures play a crucial role in continual improvement, define lessons learned during projects, and form a guideline in case of changes and unexpected situations to enhance performance, fulfill customer requirements, and increase all stakeholder satisfaction.

- **Non-Conformities Identifications**
  - Inspections: the company should execute regular inspections processes to identify non-conformities, this involves the implementation process, incoming materials, and already executed actions.
  - Quality control feedback.
  - Client feedback.
- **Responding to non-conformities**
  - Documentation: the company should document all the cases of non-conformities.
  - Sensitivity assessment: the company should develop a scale for the non-conformities' situations.
  - Reasons analysis: the company should define the main cause of the non-conformities.
- **Corrective Actions**
  - Develop new procedure based on sensitivity assessment.
  - Allocate recourses.
  - Distribute responsibilities.

- **Continues Improvement**
  - Review the evaluation: the company should review the situation and evaluate the effectiveness of the corrective action.

4.2. Results After Implementation

1. Reduce the rate of errors during the implementation process by 95%.
2. Reduce material waste by 85%.
3. Increase customer satisfaction by 90%.
4. Increase employee involvement by 90%.

4.3. Discussion

Reduce the Rate of errors During the Implementation Process by 95%

The expert senior quality manager stated that according to the previous quality management system, the small construction company would be able to cut 95% of the errors during the entire process, which is approximately a perfect and non-defects process with a ratio of 5% error compared to the current process of the company, which is facing 35% error ratio. According to this the first hypothesis of this research is accepted. The manager stated that 40% of the errors are related to customers, and that is because of the lack of engagement between stakeholders during the implementation process, which sometimes results in redoing some parts or changes in the process, and that is directly related to the absence of customers during the implementation process. The remaining 60% is tied to the business as a result of poor management and quality control throughout the process, poor communication and coordination between various departments especially Structural and implementation departments, and a lack of management between the business and its suppliers. In other words, the senior manager stated that the quality system is qualified to eliminate errors coming from the customer side by engaging them in all stages of the process and is also able to monitor, control, and evaluate implementation process by resource management, suppliers management, quality control, support processes, and a strong connections between departments to accomplish the project with the least percentage of errors.

Reduce Material Waste by 90%

The expert senior quality manager stated that according to the previous quality management system, the small construction company would be able to reduce material waste by 90% which is more than what was planned to, and this confirms that the second hypothesis in this research is acceptedd. The company is facing a bad situation due to the high rate of material waste which is 40% as it causes extra costs for the company, and that is because of the lack of connection between the structural department and the logistics department and the lack of quality control on the resources needed. Also, the lack of communication between procurement and suppliers results in procuring inaccurate quantities, causing massive material waste. Moreover, the lack of connection and communication between the departments, especially the logistics department, is causing a high ratio of material waste in the warehouse. In addition, the expert quality manager stated that errors during the implementation process have a significant impact on material waste reduction, declaring that reducing implementation errors will reduce material waste. In other words, coordination among logistics, implementation, structural, and administration departments makes the system able to control resource usage by forming an effective resource management, with support from the quality control department to monitor and control resource usage and seek a process free from waste.

Increase Customer Satisfaction by 90%.

The statement from the senior quality manager was that the quality system will enable the company to enhance customer satisfaction by 90%. This rate is more than expected according to the third hypothesis (increase customer satisfaction by 80%), which means it is accepted. 90% is a great percentage compared to the current situation of the company where the customer satisfaction rate does not exceed 60%. During the life cycle of the company's projects, customers have low engagement with the whole process, and that is because of the lack of participation during important phases of projects, especially the process of collecting customer requirements, which negatively influences the implementation process. Also, errors during the implementation process or during any other processes cause customers dissatisfaction and damage the reputation of the company. The manager stated that emphasizing customer role and requirements, increasing customer participation during the whole process, and optimizing the connection between the

company and customers will have a huge positive impact on customer satisfaction, as customers feel their importance during the process, which is what the quality management system is able to do. At the same time, engaging customers throughout the process will reduce errors and increase customer satisfaction which will enhance the company's efficiency and performance.

Increase Employee Involvement by 90%.

The group meeting with the company's employees declared that due to the quality system, employee involvement will exceed 90% improvement. The senior quality manager stated that due to the missing of the quality control department in the structure of the company, employees' behavior and connections are not under monitoring and control, which increased the coherent between them. the senior structural engineer, the field engineer, the procurement specialist, and the top management stated that because of the job title due to the organizational roles and responsibilities, employee will absolutely involve in the system as stakeholders in projects. According to this, the forth hypothesis is accepted.

5. Conclusion and Proposals

5.1. Defects and Errors Reduction

According to the top management and senior quality management, 40% of the defects and errors coming from customers will be managed by increasing the engagement of customers during the implementation process to ensure that products always meet or exceed customers' expectations. This increase will be the result of the communication methods that the system defines, quality assurance procedures for suppliers that involve customer responsibilities, and quality control procedures in the management process of the company. In addition, the policy and the scope of the company demonstrates the emphasis placed on customers as stakeholders in the process to form a basis for all stakeholders to increase customers' involvement. At the same time, the other 60% of defects and errors that are related to the company will be managed by optimizing efficiency in the management process and quality control during the implementation process, improving connections among departments, and filling gaps between suppliers and the company. The process approach and the implementation process flow define strong resource management for projects, supported by quality control and quality assurance procedures to ensure effective management and quality control during the implementation process. Also, the organizational roles and responsibilities and the organizational chart structure create a strong connection among departments with full support from the communication procedures that the system recruits. Moreover, due to the non-conformities and corrective actions the company will be able to reduce defects and errors continuously in projects. Finally, quality assurance for suppliers' procedures, like suppliers' selection and supplier management, ensures a high-quality management process with suppliers.

Adopting methods like user acceptance of results and establishing channels for customer communication are recommended for the early implementation of the prototype. The user accepting results includes feedback from customers during the implementation process and channels to express their opinion. Seeking to reduce the other 60% coming from company-side official training courses in the company is useful to start the implementation. In addition, developing a culture of quality in the company is a valuable method to ensure quality policy functioning for all members and stakeholders. Communication technology is useful for resource

management because it provides powerful methods to control the resource process during implementation. Moreover, for supplier selection during the early implementation, the company should focus more on the quality aspect than the financial aspect to ensure quality during the whole implementation. Finally, establishing an auditing program for the system is mandatory to guarantee an effective system; it involves defining audit scope and objectives, selecting an audit team, defining a checklist, and it can be the same as one of the quality assurances to ensure an effective quality assurance procedure, planning audit activities, reporting and documenting, and corrective actions.

5.2. Material Waste Reduction

Because of the quality system, the company will be able to manage all the issues related to resource management, communication among departments, especially logistics and warehouse departments, and quality control issues. This will be achievable due to the process approach that defines three main and essential processes for the company: the management process, which forms strong resource management aligned with quality control; the support process, which paves the way for perfect execution in the core process; and the core process, which includes designing, allocating resources, executions, and sales. These three processes establish a powerful and clear relationship among departments that are responsible for preparing the resources needed, allocating the resources, storing the resources, and moving the resources to the execution field, with full support from quality control and quality assurance procedures, which ensure all three processes are going under quality standards and regulations, in addition to strong communication methods that ensure strong and comprehensive communication among stakeholders. According to quality assurance for suppliers' procedures, the organization will guarantee accurate quantities of materials and equipment to ensure the process is free of waste, considering that reducing defects and errors will result in a significant reduction in material waste.

For early implementation of the prototype, it is recommended to start investing in advanced technology in the field of the warehouse. Adopting a warehouse management system is useful to ensure powerful resource management and storage. For example, sap warehouse management SAP WM would be a comprehensive system for warehouse management It offers functions including cross-docking, replenishment, and inventory management. Also, building strong relationships and programs with suppliers is very helpful at the early beginning of the implementation to ensure the

refund policy. Finally, conducting training courses for warehouse workers like material handling training, inventory training, and safety training is obligatory. Also, holding regular meetings between logistics, warehouse, and implementation departments is mandatory for early implementation of the system.

5.3. Increasing Customer Satisfaction

As a result of the errors and defects during the implementation process and the low engagement of customers during the life cycle of the project, the company is facing low customer satisfaction. However, due to the quality system policy and scope, emphasis on customer satisfaction will increase. Through its commitment to quality and customer satisfaction, the quality policy emphasizes customer requirements and satisfaction during projects and structures a way for all stakeholders to prioritize meeting customer requirements and needs to enhance customer satisfaction. In the core process, the sales department is required to receive all customer needs and requirements in order to accomplish projects that precisely meet customer needs. In addition, quality assurance sets responsibilities for customers during the life cycle of the project to guarantee their existence during most processes in the project with full monitoring and control from the quality department. Also, the company's members strive hard to achieve quality objectives that involve increasing customer satisfaction. Moreover, the process approach requires the marketing department to conduct surveys about customer satisfaction to ensure that during the life cycle of the project, customers are satisfied. Finally, communication methods in the system ensure a strong connection between company and customer to increase customer involvement during projects, taking into consideration that decreasing defects and errors during the implementation process will contribute to increasing customer satisfaction.

Customer focus is the most important principle for small businesses seeking expanding and building reputation, which requires focusing on customer channel procedures and investing in advanced technology to ensure customer satisfaction and involvement at the early implementation stage. Investing in technology is a valuable method for marketing to express customer satisfaction is mandatory for increasing customer satisfaction. Finally, focusing on feedback actions taken like videos and photos with feedback for rework and impropriate work by E-channels between the company and customers is really recommended to enhance customer satisfaction.

5.4. Employee Involvement

The organizational roles and responsibilities, including the organization chart, define strong connections between company members, form the title job in the company, and clearly demonstrate duties and responsibilities to ensure all employees' performance is optimized. Quality policy emphasizes the involvement of employees during projects, and communication methods connect all employees in the company to ensure the best performance and involvement. Training procedures for employees in the company ensure that employees receive all the required knowledge for projects. Finally, quality assurance procedures and quality control make efforts to ensure all employees are connected to accomplish projects with great employee involvement.

Adapting methods to increase involvement, like recognition procedures, is recommended for starting to build a strong relationship with employees, and establishing career development procedures is essential for early implementation to ensure continuous improvement through employees. To pursue the best employee involvement, training courses should be regularly conducted, and rewards for positive performance should be given to build a strong relationship with employees. Finally, investing in employee growth is crucial from the beginning to guarantee an experienced and qualified team for the process, as offering the opportunity to increase employee knowledge and experience through free courses related to the major should have a positive impact on employees' development.

In general, the organization will be able to improve performance, profit and revenue, and client satisfaction by minimizing mistakes, defects, and material waste. Moreover, a higher level of employee participation will guarantee long-term performance optimization for the business and lower the incidence of mistakes and faults. Keeping in mind, raising customer happiness will boost revenue, the company's efficacy, and its reputation. Finally,

5.5. Recommendations for Future Research

For future research, develop a quality management system according to the ISO 14001:2015 standards, which involves environmental management, to guarantee a cleaner environment, as construction companies include processes against the environment, which brings the necessity of defining a system to solve environmental problems, manage them, and guarantee improvement. Also, it is important to study the impact of the integrated systems on the organization and evaluate the results coming from the implementation of the integrated system, and.

Developing a system for bigger companies starting with this quality system is useful, comparing between the impact of the ISO 9001:2015 on small and large companies from financial, technical aspects is important and valuable.

This research was built on performance standards, as it is recommended to evaluate the long-term impact of the system on organizations, evaluate the financial impact of the system on the organization, and build strong friendships and relationships with suppliers. It is also recommended to seek total quality management, as it is important for continued improvement. Seeking total quality management requires more expansion in the performance measurement of the organization. Finally, developing systems to recognize employees and increase their involvement is recommended for total quality management.

Developing an auditing system for the company is useful. Auditing is a powerful tool to ensure the proper implementation and performance of the system; it evaluates the system and makes sure all processes and activities are going according to ISO 9001:2015; it also defines areas for continuous improvement in the system to enhance continuous improvement.

Moreover, developing an integrated system based on ISO 9001:2015 and ISO 9004:2015 is recommended after implementation, as ISO 9001:2015 provides requirements for developing a quality management system, while ISO 9004:2015 provides guidance for improving the system, seeking continuous improvement. Evaluating the impact of the integrated system on the organizational performance and the financial performance is recommended.

This research is on how small construction companies will adapt the system aligning with Syrian regulation, which means conducting research on the effects of the Syrian regulation on the system

should be valuable research, and how the Syrian standardization and quality organization affect the system should be an important one as well.

Conducting research about suppliers' impact on the system is crucial for small construction companies. Developing a system for suppliers' selection is important to enhance performance in the long term, as construction processes depend on suppliers in most processes, and enhancing supplier management and selection will positively influence organizational performance.

Finally, it is recommended to expand on ISO 9001:2015 principles to achieve total quality management, as the process approach in ISO 9001:2015 focuses on process management; seeking total quality management requires more expansion in the process approach to include continued improvement for all those processes. Also, integrating technology to develop a robust system of data analysis is important and recommended for future research in order to enhance total quality management.

6. **Summary**

In response to difficulties and challenges faced by small construction companies in Syria, a quality management system according to ISO 9001:2015 was developed throughout this research for this kind of organizations to decrease defects and errors during the implementation process of these companies, reduce material waste ratios, increase customer satisfaction, and optimize employee involvement in order to enhance company efficiency for the long term. The literature review of this research provides an overview of quality management systems according to ISO 9001:2015 standards, covering the history of quality management, and demonstrates ISO family standards, focusing on ISO 9001:2015 standards to highlight its principles, procedures, practices, requirements, and policies to express the importance and benefits of the system through various industries, especially for small construction companies and industries. This research uses a design science research methodology to design the quality system according to ISO 9001:2015. Additionally, a small construction company in Syria was examined to develop the quality system and ensure its effectiveness. Interviews were conducted with the senior quality manager, the owner of the company, and employees to understand the company's problems and design a powerful and suitable quality management system in order to make sure that the quality system is able to solve the company's problems and guarantee the best performance. The research's results demonstrate the situation after applying the system to the company and ensure that all hypothesizes are accepted. Because of the system, the company will be able to reduce errors and defects rate during the implementation process, which will result in increasing efficiency and facilitating implementation by reducing rework processes, decreasing material waste, and a significant increase in customer satisfaction. Also, because of the system, the company will decrease material waste during its process, which will positively influence its income, reduce cost, and enhance environmental sustainability. Moreover, due to the increase in customer satisfaction because of the system, the company will enhance its reputation, which will positively affect the income and sales of the corporation. Eventually, the results show that the system can enhance employee involvement to guarantee better processes and enhance the effectiveness of the company. In conclusion, this research provides a valuable method for small construction companies in Syria that face problems and difficulties such as errors and defects, material waste, low customer satisfaction, and weak employee involvement. By implementing the system, these companies will have the opportunity

to solve these kinds of problems and achieve significant improvements to enhance long-term efficiency. The system will ensure that the company will prevent errors and defects during its processes and procedures, save costs by reducing material waste, increase customer satisfaction to guarantee a powerful reputation in the market seeking additional income, and guarantee employee involvement during processes and procedures.

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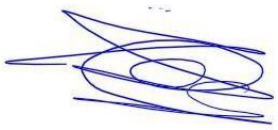

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