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# Evaluating the relationship between the requirements for obtaining the (ISO 9001: 2015) and the terms of product realization in the Prefabricated Building Factory / Kirkuk

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**Abstract**

The study presents a diagnosis and analysis of the gap between the items of product realization, in the prefabricated building uilding factory in Kirkuk Governorate / Iraq, and the standards required to be present to obtain the International Standards Certificate (ISO 9001:2015), in a way that contributes to understanding and adopting those requirements as standard standards. An international qualification qualifies the research factory to obtain this certificate, and to achieve this, the examination list was approved, which contributed to providing many answers that enabled researchers to obtain the necessary data, achieve the objectives of the study, and achieve its goals. The study reached many results, including the existence of a gap between the terms of the requirement to achieve the product, and the requirements for obtaining a certificate (ISO 9001: 2015), in theory, and in practice, which requires the research factory to develop its performance and raise it to the sufficient level, which qualifies it to obtain this certificate by the standards International standard approved.

**Keywords:** ISO 9001:2015, product realization planning, prefabricated building factory.

## 1. Introduction

Total quality is one of the strategic approaches that has become a pillar on which business organizations are based, as it seeks to provide products that satisfy the customer and add value to it that makes it superior to its counterparts from its competitors in the market. (ISO 9001:2015), an approach to its work, and a strategy on which it builds its plans directed to achieve comprehensive quality in all its activities and operations. Obtaining the international standards certificate (ISO 9001:2015) has become one of the basic conditions for competitiveness at the local and international levels. Which necessitates adopting these requirements and counting them among the priorities of survival, growth, and continuity. Accordingly, the organizations had to strive to diagnose the actual reality of the existing total quality system, which is approved by them, and the requirements for obtaining the international standards certificate (ISO 9001:2015), and this is what this study sought through its four sections, as the first touched on the methodology of the study, and presented The second presented the theoretical framework, the third presented the analytical framework for the study, and the fourth concluded with conclusions and suggestions.

### 1.1 The study problem

The obtainment of the research factory for the international standards certificate (ISO 9001, 2015) requires a statement of the extent of its commitment to the terms of the requirement to achieve the product, so we can present the problem of the study through the following two questions:

1. What is the interest of the research factory in applying the terms of the requirement to achieve the product to obtain the certificate of international standards (ISO 9001, 2015)?



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2. Are the reasons for not qualifying the researched factory to obtain the international standards certificate (ISO 9001, 2015) due to the lack of a requirement to achieve the product? Or for other reasons?

**1.2 The importance of the study**

The importance of the study is reflected in its attempt to invest and employ the results that have been reached to ensure the improvement of the state of the approved quality system in the factory in question, and its qualification to obtain the International Standards Certificate (ISO 9001: 2015), through the development of appropriate treatments to reduce the gap between the actual reality of the items of the requirement to achieve the product And the international standard requirements required for a comprehensive quality system that matches international standards and standards, and this step is a starting point for the research factory to be qualified to obtain the international standards certificate (ISO 9001: 2015).

**1.3 Objectives of the study**

In light of defining the problem of the study and its importance, we can clarify the objectives of the study as follows:

1. Recognizing the concept of (ISO9001:2015), determining its importance, and the principles on which it is based.

2. Determining the nature of the requirement to achieve the product needed to obtain the international standards certificate (ISO 9001: 2015).

3. Diagnosing the most important determinants that hinder its application in the factory in question, with proposing alternatives to treat them and improve the reality of achieving the product in it.

**1.4 The hypothesis of the study**

The study is based on the main hypothesis that: "The pre-fabricated construction factory in Kirkuk governorate did not obtain the International Standard Certificate (ISO 9001: 2015) due in part to the lack of product fulfillment requirements".

**1.5 The study community**

The study dealt with the presentation and analysis of the prefabricated building factory in Kirkuk Governorate / Iraq.

**1.6 Methods of data collection**

In building its theoretical framework, the study relied on many sources that provided it with the necessary information that enabled it to complete and provide an adequate definition of its dimensions. The checklist called the Gap Analysis Examination, which aims to diagnose the gap that exists between the actual approved reality of the quality management system in the organization, and the requirements of the international standard necessary to obtain the International Standard Certificate (ISO 9001, 2015), and for this purpose, the scale was used Seven by allocating a specific weight to each paragraph of that scale.



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### 1.7 Statistical Analysis Methods

A checklist was adopted that enriched the study with many statistical methods with the results that contributed to testing its hypothesis and enabled it to achieve the results it was targeting.

### 1.8 The limits of the study

1 .Scientific limits. The study is scientifically determined by its objectives.

2. Spatial boundaries. The prefabricated construction factory of the Iraqi Ministry of Construction and Housing was chosen due to the factory's readiness to cooperate at a high level by applying and documenting the requirement (product realization) one of the requirements for obtaining the international standards certificate (ISO 9001:2015) to identify the defect to treat it.

## 2. Theoretical framework ISO 9001: 2015

### 2.1 (ISO 9000) concept and importance

The term (ISO 9000) refers to a set of quality management standards, and it consists of three standards (ISO 9000, 9001, 9004). As (ISO 9001: 2000) represents the international standard, while (ISO 9001, 2008) represents the requirements of the quality management system through which the organization must demonstrate its ability to provide products that address customer requirements and enhance their satisfaction as well as legal controls. (2008: ISO 9004 is concerned with providing guidelines for improving the quality management system [1], and the recent version (ISO 9000: 2015) focuses on promoting the process approach to developing quality management systems, as it is built according to the belief that the desired results are achieved more efficiently when looking at the activities and associated resources as a process.

Many definitions have been given to (ISO 9000), including "a series of instructions for organizations to establish their quality system by focusing on procedures, control, documentation, which is supposed to assist organizations in identifying errors, and ensuring the flow of operational processes to ensure a consistent level of quality." [2] As for (ISO), it considers it "a family name for quality management standards, and organizations use it to ensure the conformity and quality of their products" (ISO.Org, 2004, 1), as it was defined as "a set of guidelines for organizations to establish quality systems by focusing on procedures, control, documentation, it also helps organizations to identify errors, streamline operational processes, and ensure the level of quality [3].

From the foregoing, the researchers define it as "a set of well-known, accepted and internationally recognized standards and guidelines that use the process approach to help organizations achieve the required quality and reach customer satisfaction by meeting and exceeding their expectations for the product. The guidelines are based on building and establishing a quality system that achieves value for organizations by achieving certain levels of quality.

The importance of (ISO 9000) lies in its global orientation, as it is supported by the International Organization for Standardization and from more than (120) countries, which



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made it a logical choice for any organization wishing to acquire a global character. Moreover, its contents are useful and important [4]. The flexible nature also increased its importance for its ease of understanding and application in the field of business and the possibility of its compatibility with the strategies and characteristics of the organization. Also, obtaining the ISO 9000 certificate is a guide provided by the organization to its customers that indicates the correctness of the approach it follows and the quality of its products, and it can be considered the beginning and not the end. After obtaining the certificate, the organization can integrate with other quality models such as total quality management [5] to achieve continuous improvement.

The implementation of (ISO 9000) requires great efforts in planning this process and a large investment in materials, funds, and human resources, and achieves many benefits, including the following:

1. Contributes to the efficient and effective management of quality systems[6] .

2. Increasing the efficiency and profits of organizations by increasing confidence in the production system in them.[4]

3. Achieving customer satisfaction by linking the process closely to its requirements.

4. Increasing and maintaining market share.

5. Increasing the effectiveness of communications among the members of the organization and raising the morale of the employees.

6. Reducing costs, as well as reducing spoilage, obsolete inventory, and returned work.

7. Increasing the competitiveness of the organization.[3]

8. Better control and greater preservation of the organization's systems.(6)

9. Facilitate the compatibility and consistency of the quality system with the rest of the systems [2].

**2.2 The basic principles of (ISO 9000) and its requirements**

The implementation of (ISO 9000) is based on a number of the following basic principles : [5]

1**. Focus on the customer**, the ability to understand the current and future requirements of customers, and work to meet them.

2**. Senior management**, the senior management undertakes a set of tasks to reach the requirements of (ISO 9000), and these tasks include setting a method for managing its operations, defining policies and objectives, and periodically reviewing these objectives and policies to increase the effectiveness of the system, leading communications with customers to determine their needs and desires, setting goals Quality and its dissemination throughout the organization, ensuring the effectiveness of internal and external communications.

3. **Participation of employees**, this principle can be considered one of the most important principles in the organization. Workers are the essence of the organization’s operations, and



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the nerve that promotes the proper and correct implementation of tasks and duties, and accordingly there can be nothing more valuable than the human element.

4**. Process entrance**, the process entrance is used to build an efficient management system, through which the customer can be satisfied by providing a service that meets his needs, as well as documenting the process and matching the inputs and outputs to the activities carried out by the organization.

5. **The entrance to the system in management**. This principle aims at building an effective management system, as well as identifying and understanding the interrelationships of the process to achieve the objectives of the organization.

6. **Continuous improvement,** is the ability to make and implement improvements, to improve all the operations and activities of the organization for the better, as well as racing with the customer in reaching advanced stages of providing the products that the organization wants to impress and satisfy, and thus maintaining its share of the customer in the market that ensures its survival. and its continuity.

7. **The realistic approach to decision-making**. The organization's metrics provide the basic data for the decision-making process.

8. **Mutual beneficial relationships with suppliers**, the organization builds stable and solid relationships with suppliers so that they become an extension of it and an important part of it, as well as providing the necessary support to them to ensure that they meet the requirements of the organization.

As for the basic requirements of the standard (ISO 9000), the new revision included radical changes in the construction of (ISO 9000) standards, but it retained the essence of the basic requirements of the old standards. (20) items have been reduced from those contained in the old standards to five parts contained in the new standards, namely the quality management system (4), management responsibilities (5), product realization planning (6), product realization (7), measurement, analysis, Improvement (8.),[7]

From the foregoing, researchers believe that obtaining the International Standard Certificate (ISO 9000) is one of the most prominent main topics that have spread in the current and past century, which aroused the interest of researchers, specialists, industrial and service organizations and that the body that issues and maintains it is the International Organization for Standardization, and the rules are updated It is a quality management system that has documented and agreed requirements, which makes it easier for the organization to conform to them and makes the integration between them a reality and the existence of all of them is a necessity. From it, one does not represent a substitute for the other in the system.

## 3. The analytical framework of the study

### 3.1 A description of the research sample

**3.1.1 A historical overview of the parent company**, Al-Mansour General Company for Construction Contracting, the Iraqi Ministry of Construction and Housing

The parent company, Al-Mansour General Company for Construction Contracting, was established among five major companies with the aim of:

Reorganization of work in the construction sector.



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Improving production and raising the level and efficiency of performance

Achieving optimal use of economic and human resources by adopting qualified and experienced cadres

Al-Mansour Company is considered an extension of government companies and institutions that have adopted the construction of infrastructure and the reconstruction of Iraq from the mid-fifties of the last century until now.

### 3.1.2 The production plants of the company

The company owns a group of various types of production plants distributed over the governorates of Baghdad, Kirkuk, Mosul, and Hilla, which include the two largest plants in the country for the production of prefabricated building panels for residential buildings, the first is located in Baghdad and the second is in Kirkuk, while the Nahrawan factory for the production of concrete panels is located in Baghdad as well. There are four Other factories for the production of the block, two of them in Mosul and the others in Kirkuk and Hilla, which also includes a factory for mosaic.

All factories suffer from great technological backwardness because of their oldness, in addition to the accumulation of a legacy as a result of the repercussions of the repeated wars and the international siege that lasted for a very long time, during which Iraq moved away from a lot of modernity and progress.

To reduce the time gap and restore life to the entire factory above, the company aims to adopt the investment law as an entry point for the transfer of technology and modern scientific innovations in the fields of production, including the building of modern residential buildings commensurate with the climatic conditions in terms of thermal, water and sound insulation, as well as working to raise productivity through Developing and increasing production lines in a way that is consistent with the size of the tasks undertaken by the Ministry of Construction and Housing and its private companies in meeting the country's need of housing units that exceed one million housing units.

### 3.1.3 The company's strategy

The company is looking forward to exercising its previous roles through effective participation in the implementation of the reconstruction projects currently, by employing the talents and the accumulated experience of its advanced cadre in the field of implementation and reconstruction with the capabilities currently available. executive and the size of the cadre, which exceeds (1600) members, as well as the company, seeks to improve and develop its capabilities, including- :

1. Achieving sustainable human development and keeping it in line with the spirit of the age and its requirements, developing skills and capabilities, and improving performance efficiency through participation in scientific and training courses and conferences.

3. Modernizing and developing the company’s mechanisms and equipment in a manner consistent with the accuracy of implementation and reducing the implementation time.

4. Operating, developing, rehabilitating, and improving the company's current production plants by developing its products and their quality in line with modern construction methods.

5. Importing all that is new from the various activities of the company, especially the field of construction technology, with construction equipment, materials, and engineering implementation methods.

6. Planning to improve quality according to technical specifications and emphasize quality through quality control procedures because the company specializes in building and construction works, as well as developing competencies, refining talents, and expanding partnerships with international companies in various disciplines, which contributes to raising



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the efficiency and speed of implementation because the Iraq reconstruction program needs to be increased In vocabulary and reduce the duration by adopting modern Altklnojnh methods.

### 3.2 Examination of quality requirements in the prefab factory Kirkuk according to international standards (ISO 9001 2015).

This topic deals with the presentation of the data shown by the checklists used to determine the availability of the requirement to achieve the product in the prefabricated construction factory. As the researchers relied on their formulation of questions on the scale [4], as well as the lists issued by the Central Organization for Standardization and Quality Control, these lists are more appropriate to the reality of the construction industry environment, and to show the extent of the gap between the current quality system and the requirements of ISO (ISO 9001). It will depend on the quantitative expression of the answers in the checklists, which will be analyzed to produce results that prove the hypothesis of the study. Below are the results of the analysis of the checklists for this requirement.

#### 3.2.1 product realization

The requirement to achieve the product as one of the requirements of ISO 9001:2015 cannot be achieved without the support and conviction of the organization to apply these requirements, which positively affects the conviction of all employees in the company to implement and fully document these requirements. The requirement to achieve the product is divided into (6) six paragraphs, each paragraph containing a set of questions The paragraphs will be dealt with according to the sequence contained in the checklist.

Among the most important provisions of this requirement are-:

**1. Product realization planning**

One of the requirements for organizing special events represents product realization. The checklist for the requirement (planning to achieve the product) which includes (5) items has been used to show the extent of application and documentation of the paragraphs of this requirement by the ISO specification ISO 9001:2015 (Table 1).

1= completely implemented and completely documented

2= completely Applied and Partially Applied

3= Completely implemented and undocumented

4= Partially applied, Completely documented

5= Partially Applied and Partially Documented

6= Partially Applied Undocumented

7= Not applicable Not documented



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**Table (1) The checklist for the application and documentation of the requirement (planning to achieve the product) according to ISO 9001:2015**

| | product realization | Conformance with ISO 9001:2015 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1. Product realization planning | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | The factory develops a detailed plan for the operations necessary to achieve the objectives and quality requirements before and during production operations | | * | | | | | |
| 2 | There are documented procedures for inspection and testing to ensure that product quality requirements are met. | | * | | | | | |
| 3 | The factory has records to prove the conformity of quality requirements in processes and products. | | | * | | | | |
| 4 | Responsibilities and powers are defined precisely and documented in the inspection and testing system upon receipt of raw materials and in the various stages of manufacture. | | | * | | | | |
| 5 | It is ensured that the planning processes are compatible with the approved technology, equipment, and methods of work in the prefabricated construction factory. | | * | | | | | |
| | weights | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | repetitions | 0 | 3 | 2 | 0 | 0 | 0 | 0 |
| | The result | 0 | 0 | 0 | 0 | 8 | 15 | 0 |
| | weighted arithmetic mean (average) | **4.66** | | | | | | |
| | Match extent percentage | **%76.66** | | | | | | |
| | Gap size | **%23.33** | | | | | | |

Based on the checklist for the requirement (planning to achieve the product) shown in Table (1), the factory obtained an average of approximately (4) degrees out of (6) degrees. This indicates a partial application and lack of documentation of the paragraphs of this requirement. As stipulated in the ISO specification: 9001, with a percentage of (76.66%), which indicates the existence of a gap of (23.33%) due to the following reasons:

1 .Failure to verify documentation procedures for inspection and testing processes.



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2. The factory does not have records to prove the conformity of quality requirements in processes and products.

**2. Customer-related operations**

The customer is considered the main target for companies that provide (goods and services) alike, as the consumer of these products, so it is one of the elements for the continuity and survival of companies. Therefore, the requirements of customer-related operations came as one of the basic requirements for obtaining the international registration certificate ISO 9001:2015. Table (2) shows the items This requirement is (9) and as follows:-

**Table (2) Checklist for implementing and documenting a requirement (customer-related operations) according to a specification**

**ISO 9001:2015**

| | **product realization** | **Conformance with ISO 9001:2015** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2. Customer-related operations | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | The factory determines the requirements of the customer, including the requirements for delivery and after-sales services. | | | | | * | | |
| 2 | The factory determines the requirements that are not specified by the customer for their necessity for use. | | | | | * | | |
| 3 | The factory determines the obligations related to the product, including legal and regulatory requirements. | | | | | * | | |
| 4 | The factory reviews each processing request to ensure that production requirements are provided. | * | | | | | | |
| 5 | Before committing to processing, the factory finds solutions to conflicting requirements. | | | | | * | | |
| 6 | New requests are presented to the various relevant departments to obtain their opinions before contracting. | | | | | | * | |
| 7 | The results of the review of contracts and applications and the consequent actions are recorded in an approved register for this purpose. | | | | | * | | |
| 8 | There is a working method for handling feedback from customers, including complaints. | | | | | * | | |



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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9 | The factory has an approved context for amending the supply contracts in the event of a change in product requirements, and the concerned parties are informed of this. | | | | * | | | |
| | weights | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | repetitions | 1 | 0 | 0 | 0 | 7 | 1 | 0 |
| | The result | 6 | 0 | 0 | 0 | 14 | 1 | 0 |
| | weighted arithmetic mean (average) | **23.34** | | | | | | |
| | Match extent percentage | **%39** | | | | | | |
| | Gap size | **%61** | | | | | | |

Based on the checklist for the requirement (customer-related processes) shown in Table (2), the factory obtained a rate of (2), and this indicates the partial application and lack of documentation of the terms of this requirement and as stipulated in ISO 9001:2015, in addition to this requirement obtaining A percentage of (39%) for the extent of conformity, which indicates the existence of a gap of (61%) and the reason for this gap is due to the following:

1. The attention of the ready-made construction lab in documenting the paragraphs of the requirement (customer-related operations) and not giving the application the same attention.

2. The factory does not have enough flexibility in adapting to the requirements of the product if there is a change in the supply contracts.

3. The scarcity of studies related to the tastes and desires of customers.

**3. Design and development**

It represents one of the requirements for the paragraph (design and development), and the checklist for this requirement came with (12) items to reveal the amount of application and documentation according to the text of the ISO specification ISO 9001: 2015 Table (3).

**Table (3) Checklist for the application and documentation of the requirement (design and development) according to ISO: 9001 2015**

| **product realization** | **Conformance with ISO 9001:2015** |
|---|---|



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| | 3. Design and development | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 1 | The design and development stages are planned from the conception to the production stage and the use stage. | * | | | | | | |
| 2 | Verification and access are reviewed for each stage of design and development. | | * | | | | | |
| 3 | The responsibilities and powers of those implementing design and development activities are defined. | | * | | | | | |
| 4 | A work context is followed to manage and organize the interrelated activities between the various departments responsible for the design and development activities to ensure clarity of responsibilities and efficient communication. | | * | | | | | |
| 5 | Statutory, legal, and performance requirements are identified and documented as inputs to the design process. | | * | | | | | |
| 6 | Design inputs are reviewed to ensure their adequacy and find solutions to non-agreed requirements as well as vague and unintegrated ones. | | | * | | | | |
| 7 | The design and development outputs are documented in a way that is easy to verify according to their input. | | | * | | | | |
| 8 | It is ensured that the design and development outputs meet the input requirements. | | | | * | | | |
| 9 | The design and development outputs provide sufficient information for the procurement and services processes. | | | | | * | | |
| 10 | Design and development outputs refer to product acceptance criteria. | | | | * | | | |
| 11 | The validity of the design and development is checked to ensure that the requirements for use are met before production begins, and this is documented in a special record. | | | | | * | | |
| 12 | The changes that occur in the design and development are identified and documented, and the validity of those changes is verified under a special record. | | | | | * | | |
| | weights | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | repetitions | 2 | 4 | 3 | 3 | 3 | 0 | 0 |
| | The result | 12 | 26 | 12 | 9 | 6 | 0 | 0 |



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| | |
|---|---|
| weighted arithmetic mean (average) | **4.3** |
| Match extent percentage | **%72** |
| Gap size | **%28** |

Based on the checklist for the requirement (design and development) shown in Table (3), the lab obtained an average of (4.3) degrees and by rounding this number to (4), and in comparison with the items of the seven-scale used, it can be noted that the lab reaches the level of application and total documentation of the design items and development.

As stipulated in the ISO specification ISO 9001:2015, a percentage of application and documentation reached (72%) to implement and document the paragraphs of this requirement, which indicates that there is a gap between the actual quality of the prefabricated factory and the requirements of ISO 9001:2015 estimated at (28%). Return it for the following reasons-:

1. The lab neglects design and development access checks, which negatively affect the fulfillment of use requirements.

2. The lab's lack of interest in determining the changes that occur in the design during the production process.

**4. Purchases**

The process of controlling the purchased materials is one of the important requirements according to ISO 9001:2015, and the checklist for this requirement came with (4) items to show the extent of the factory's application and documentation of this requirement, as shown in Table (4).

**Table (4) Checklist for the application and documentation of the (purchasing) requirement by ISO: 9001 2015**

| | **product realization** | **Conformance with ISO 9001:2015** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 4. Purchases | 1 | 2 | 3 | 4 | 5 | 6 | **7** |
| 1 | The changes that occur in the design and development are identified and documented, and the validity of those changes is verified under a special record. | | | | * | | | |
| 2 | The procurement documents (tender announcement) include data clearly describing what is required (category, rank, | | | | * | | | |



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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | examination instructions, and any other relevant data). | | | | | | | |
| 3 | The factory reviews the purchase documents to ensure their accuracy and information. | | | | * | | | |
| 4 | The factory determines and carries out the necessary checks to ensure the quality of the materials purchased at the supplier's site in the company. | | | | * | | | |
| | weights | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | repetitions | 0 | 0 | 0 | 2 | 2 | 0 | 0 |
| | The result | 0 | 0 | 0 | 6 | 4 | 0 | 0 |
| | weighted arithmetic mean (average) | | | | **2.5** | | | |
| | Match extent percentage | | | | **%42** | | | |
| | Gap size | | | | **%58** | | | |

Based on the checklist for the (purchasing) requirement shown in Table (4), the factory obtained a rate of (2.5), and approximately we have the number (2). In comparison with the paragraphs of the seven-scale used, we note that the factory has reached the level of application and partial documentation of the items of the procurement requirement with a percentage Upon application and documentation, it amounted to (42%), which indicates that there is a gap between the reality of quality in the factory and the procurement requirement according to the international standard ISO 9001:2015, with a value of (58%) due to:

1. Not adopting specific and documented criteria for selecting suppliers.

2. The factory neglects the process of careful examination of the purchased materials, especially the machines and equipment used in the production processes.

## 5. Production and service operations

Table (5) shows the checklist for the requirement (production operations and services), which shows the extent of application and documentation of the provisions of this requirement and according to the international standard ISO 9001:2015, and this requirement came with (12) items, see Table.(5)

**Table (5) Checklist for the application and documentation of the requirement (production processes and services) according to ISO 9001:2015**



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| | product realization | Conformance with ISO 9001:2015 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 5. Production and service operations | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | Production operations are carried out under controlled conditions. | * | | | | | | |
| 2 | Clear information is available to determine the quality characteristics of the product. | * | | | | | | |
| 3 | The production equipment is in a state that enables it to achieve the required accuracy for production operations. | | * | | | | | |
| 4 | There are clear work instructions for the implementers of production operations. | | * | | | | | |
| 5 | The factory verifies the validity of the production and service operations if it is not possible to immediately verify the results. | | | | * | | | |
| 6 | The criteria for review and validity of the operation are specified in paragraph(6) . | | | | * | | | |
| 7 | Approval of the equipment and the qualifications of the personnel shall be carried out for Paragraph(6) . | | | | * | | | |
| 8 | Validity of access and validation is re-checked for paragraph (6). | | | | * | | | |
| 9 | The activities in paragraphs (2, 8, and 9) are documented in a special register for this purpose. | | | | | | | * |
| 10 | There are procedures to distinguish products through distinctive cards or advertisements placed on the product or its container during the production process. | | | | | | | * |
| 11 | There are procedures for numbering products or placing distinctive marks indicating the origin and method of use in the cases stipulated in the contract or instructions. | | | | * | | | |



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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12 | Adopting a special record for the numbers of products or production batches, or they are distinguished in a way that is easy to trace after being used by the customer. | | | | * | | | |
| | weights | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | repetitions | 2 | 2 | 0 | 6 | 0 | 0 | 2 |
| | The result | 12 | 10 | 0 | 18 | 0 | 0 | 0 |
| | weighted arithmetic mean (average) | | | | **3.34** | | | |
| | Match extent percentage | | | | **%55** | | | |
| | Gap size | | | | **%45** | | | |

Based on the checklist for the requirement (production processes and services) shown in Table (5), the lab obtained a rate of (3.34), and approximately we have the number (3), which indicates and compared to the seven-meter measurement paragraphs used, we find that the lab reaches the level of partial application and total documentation For the terms of this requirement and according to the international standard ISO 9001: 2015 and a percentage of the extent of application and documentation amounted to (55%), which indicates that there is a gap of (45%) between the actual quality level in the factory and the requirement of production processes and services, and this is due to the following reasons-:

1. The fluctuation in the electric power and the invalidity and obsolescence of the generators in the ready-made construction factory.

2. The invalidity of some of the machines used in production due to their obsolescence, as some of them entered service in the eighties of the last century.

**6. Setting monitoring and measuring devices**

For the factory to reach the degree of conformity with the text of the international standard ISO 9001:2015, it must control and calibrate the equipment used in production so as not to use devices that do not give the required results. ISO 9001: 2015 Table (6) shows the most important provisions of this requirement.

**Table(6) The checklist for the application and documentation of the requirement (controlling and measuring devices) according to the ISO specification**



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**ISO 9001:2015**

| | **product realization** | **Conformance with ISO 9001:2015** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 6. Setting monitoring and measuring devices | 1 | 2 | 3 | 4 | 5 | 6 | **7** |
| 1 | The factory determines the measurements and monitoring that must be approved and the responsibilities for their implementation. | | | | * | | | |
| 2 | The factory determines the measurement and control tools required to ensure that the product conforms to the specified specifications. | | | | | * | | |
| 3 | Ensure that measurements and monitoring are carried out in a manner consistent with their requirements. | | | | * | | | |
| 4 | Testing and measuring instruments are calibrated periodically to verify their accuracy, and the status and date of that calibration are marked and documented in a special register. | | | | | * | | |
| 5 | Testing and measuring instruments are protected from modifications that invalidate their calibration. | | | | * | | | |
| 6 | An independent system for the calibration of testing and measuring instruments is approved under a reference approved by the Central Organization for Standardization and Quality. | | | | | | * | |
| | weights | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | repetitions | 0 | 0 | 1 | 2 | 2 | 1 | 0 |
| | The result | 0 | 0 | 4 | 6 | 4 | 1 | 0 |
| | weighted arithmetic mean (average) | | | | **2.4** | | | |
| | Match extent percentage | | | | **%41** | | | |
| | Gap size | | | | **%59** | | | |

Based on the checklist for the requirement (controlling and measuring devices) shown in Table (6), the lab obtained a rate of (2). In comparison with the seven-measurement items, we find that the lab reaches the level of application and partial documentation of the paragraphs of this requirement, with a percentage of the extent of conformity amounting to (41). %) of the total items and according to the text of ISO 9001:2015, which indicates that there is a gap of (59%) between the actual quality of the prefabricated factory and the requirements of ISO. The reason for this gap is due to:

The factory's lack of interest in the standards of the measuring and control devices used leads



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to the appearance of some defects in the products.

## 4. Conclusions and suggestions

### 4.1 The conclusions

The researchers reached a set of conclusions, the most important of which are:

1. Business organizations seek to obtain the International Standards Certificate (ISO 9001: 2015) by providing the basic requirements on which to proceed towards excellence through quality.

2. To obtain the International Standards Certificate (ISO9001:2015), all requirements must be met, as no requirement can be overlooked or ignored, but all of them should exist with the same strength and sobriety.

3. The checklist is a good tool that enables business organizations to check and measure the availability of quality requirements to obtain the international standards certificate (ISO9001:2015), and thus be able to make appropriate decisions to raise the organization's reality to an acceptable level for obtaining it.

4. The statistical results show gaps between the actual reality of the requirement to plan to achieve the product to obtain the international standards certificate (ISO9001:2015) and the theoretical academic reality.

5. The factory understudy adopted continuous improvement, even if it was at rates that did not rise to the ambition of its work.

6. The management of the prefab factory did not give importance to the customer's voice, which is the basis for the existence of all business organizations in the public and private sectors, and relied entirely on the internal need as a criterion for improving quality.

7. The examined factory lacks an integrated framework to achieve quality with its requirements, which includes all activities and operations that are conducted in it.

8. Weak communication between all relevant parties in the lab (employees and management), which led to the delay in implementing the activities that could link the lab to the internal environment and its repercussions on the relationship with other parties in the external environment.

9. The methods adopted in auditing and internal auditing do not reach the desired level, which should give real and realistic results about what is being implemented in the factory under study.

### 4.2 The suggestions

In light of the previous conclusions, we offer the following suggestions:



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1. Adopting the methods and tools reviewed by the researchers and generalizing their use in all lab activities and operations, to identify strengths to strengthen them and identify weaknesses to avoid them in the future.

2. Establishing a computerized database of data to collect data related to factory operations and activities to benefit from them in future analyzes using total quality management tools.

3. The need for the management of the factory to address the main and secondary causes of the deviations that occur to it, and the need to update the technical paths to ensure the flow of the production process.

4. Focusing on the use of modern quality models and choosing the factors that can contribute to the development of quality, and not committing to one model as the optimal solution to all the problems of the factory, but taking into account the external and internal environment variables and the availability of human and financial resources that will depend on the application of the appropriate model. for the lab.

5. The factory should adopt the integration between (TQM, ISO 9001); Because the impact of integration variables on performance is more than the individual effect of each model, and thus the lab can build an effective quality system through (IS0 9001:2015), but it needs to be integrated with (TQM) to reach the degree of competitive performance and better quality.

6. Setting standards and criteria that enable the factory to ensure the achievement of useful and feasible results from internal auditing and auditing, which can be adopted by decision-makers in the factory in question to make decisions that enable the factory to move to better levels of quality.

7. The need to generalize the use of total quality management tools to all parts of the factory and through the support and support of senior management to apply these tools and train employees to use them.

8. Adopting the customer's voice as a measure of quality, and this is by paying attention to conducting research and studies that elicit information from the first and last beneficiary, who determines what his requirements, needs, and desires are, and if the factory management wants to survive, continue and grow in a market occupied and colonized by Iraqi, Arab and foreign construction companies Competition, for the customer is the king of the market and the master to whom the demands are met, and accordingly he is the first measure of quality and the criteria upon which he relies for ambition.

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