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Audit of the application of ISO standards on management

Case Study: Electro-Industries/AZAZGA

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List of abbreviations

Abbreviation	Meaning
CASCO	Conformity Assessment
CD	Committee Draft
COPOLCO	Consumer Policy
DEVCO	Developing Country Matters
DIS	Draft International Standard
E.M.U	Electric Motor Unit
EMS	Environmental Management System
ENEL	National Electronics Company
FDIS	Final Draft International Standard
Fig	Figure
GM	General Manager
IMS	Integrated Management System
ISA	International Federation of the National Standardizing Associations
ISO	International Organization for Standardization
JIT	Just-In-Time
NWIP	New Work Item Proposal
NSB	National Standards Body
PDCA	Plan Do Check Act
QMM	Quality Management Manager
QMS	Quality Management System
SC	Sub-Committees
TC	Technical Committees
TM	Technical Management Board
T.R.U	Transformer Unit
T.S.U	Transformer Service Unit
UNSCC	United Nations Standards Coordinating Committee
WD	Working Draft
WG	Working Group

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General Introduction

Today, in a competitive and globally interconnected business environment, organizations are having a constant challenge to improve their operational efficiency, ensure high standards of quality and also maintain the various regulatory requirements. In order to fulfill all these demands, many organizations have resorted to standards that are internationally recognized: for example standards established by the International Organization for Standardization (ISO). Among these standards, are those specifically established for management like ISO 9001 for quality management, ISO 14001 for environmental management and ISO 45001 for occupational health and safety. This is because organizations want to standardize their processes, ensure consistency of the quality of products and also achieve excellence in operations across different sectors. These ISO standards have played a very important role by offering structured guidelines that organization can implement in their operations and also help to reduce errors.

One of the most important aspect to discuss in this theme is Total Quality Management (TQM) which is a very broad and comprehensive approach. Its main objective is to integrate a culture of quality in every aspect of operational process by engaging very employee to achieve long term success through customer satisfaction and continuous improvement. Although theoretically, TQM has similar principles as ISO 9001, in the real world especially in developing country like Algeria, the mismanagement of TQM programs and surface-level application of ISO standards have become a barrier to real progress. This is because many of these companies adopt these quality standards simply for formality, commercial pressure and regulatory requirements without actually integrating them into their culture.

The non- compliance with standards in Algerian companies is due to various factors which may include lack of skilled personnel, poor internal auditing practices and lack of continuous improvement strategies among others. Also some companies tend to view the ISO certification as a one-time objective rather than an ongoing process.

To genuinely obtain and maintain ISO certification, organizations should undertake a more structured approach through establishing quality management systems in accordance of ISO requirements, training personnel and carrying out internal and external audits among others. Through integrating these practices into the operational strategies of an organization, Algerian enterprises cannot only secure certification but also attain the true value of quality management there-by improving their performance, gain stakeholder trust and ensure long-term sustainability.

Although Algerian companies may adopt ISO standards and TQM frameworks to improve their performance and customer satisfaction, a big difference remains between ISO certification and the actual integration of quality principles. This shallow implementation and application leads to minimal long-term impact which leads to investigation of how these systems can be effectively implemented to ensure sustained improvement. With this in mind, the following question has been raised.

What are the implications and challenges of implementing Total Quality Management (TQM) and integrating ISO standards into an organization's management system?

In order to respond to the main questions, we have formulated several secondary questions to dissect and to help us fully respond to the main question.

- **What is total quality management?**
- **What are the challenges of application of total quality management?**
- **What are the benefits of applying ISO standards in an organization by management?**
- **What are the common barriers/challenges to adopting ISO standards in organizations?**
- **What are the solutions that can improve the implementation of the ISO standards in organizations?**

General objective

The main objective of taking on this theme is to ensure that companies especially those in Algeria do not treat ISO standards as a mere formality but as a strategic tool to continuous improvement and customer improvement.

Research Methodology

To conduct this thesis, we followed a theoretical approach based on scientific methodologies which involved literature review, consulting websites, articles and other relevant dissertations related to the topic. We also adopted an empirical approach based on fieldwork, drawing on a practical case study at Electro-Industries in Azazga.

Work Plan

The first chapter is dedicated to Total Quality Management (TQM), we will examine the concepts of TQM, TQM tools and also the challenges of TQM implementation. At the end we shall give solutions to these challenges and the conclusion to the chapter.

For the second chapter, we shall talk about the implications of international organization for standardization (ISO) on management standardization. We shall dissect it with the overview of the ISO standards, the development process of the standards, the impacts of these standards on management and the challenges faced on implication of these standards then followed by a conclusion to the chapter.

In the third chapter, this is about the case study. We based this chapter on Electro-Industries in Azazga. “Audit of the Application of ISO Standards on the Management of Electro-Industries.” We shall divide it into presentation of Electro-Industries, processes used to prepare for ISO certification by Electro-Industries, Electro-industries quality policy, process to gain and maintain the ISO certificate and challenges of implication of ISO standards by companies in ALGERIA especially at Electro-Industries.

Chapter 1

TOTAL QUALITY MANAGEMENT (TQM)

Introduction

In this chapter, we are going to discuss deeply the various aspects of Total Quality Management (TQM). TQM is a wide and comprehensive approach that can be applied throughout the entire operations of an organization with the aim of implementing the culture of continuous improvement in all processes, products and services. Inspired by the quality improvement activities by some actors like Deming, Juran and Ishikawa, TQM shifts its focus from being problem-focused inspection to being a strategic approach which emphasizes quality management as a responsibility of all employees, decision-making based on data and an employee empowerment tool. Through this all, we shall enlighten the long-term goal of implementing TQM by organizations which aims to deliver consistent value to its stakeholders.

Section 1: Introduction to TQM and the concepts of TQM

This opening section sets the foundation for this study of our chapter. It introduces the basic ideas behind the implementation of TQM. We are going to explore the different definitions of TQM by different actors/authors which will help us formulate a general definition, the history and evolution of its evolution, the core principles of TQM, purpose, importance and benefits of TQM, the Concepts of TQM and elements of TQM. This will provide a strong foundation for studying how TQM can be applied in the real-world of business to improve performance and customer satisfaction.

1.1: Definition of Total Quality Management (TQM)

The concept of TQM is broad and has evolved considerably. Therefore, here are some definitions of TQM:[1]

Atkinson defines "*TQM is a strategic approach to produce the best product and service possible through constant innovation.*"[2]

According to Besterfield (1995) "*TQM as both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization. It integrates fundamental*

[1] https://expertpreviews.com/definition-of-total-quality-management-by-different-authors/
[2] Phillip E. Atkinson. "*Creating Culture Change: The Key to Successful Total Quality Management*" 1990, pg. 37.

management techniques, existing improvement efforts, and technical tools under disciplined approach."[1]

ISO states that "*TQM is a management approach for an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society*."[2]

Using a three-word definition, Wilkinson and Wither (1990)[3] define TQM as:

- Total: Every person is involved (its customers and suppliers)
- Quality: Customer requirements are met exactly
- Management: Senior executives are fully committed.

According to Zaire and Simintiras "*Total Quality Management is a combination of the socio-technical process towards doing the right things (externally), everything right (internally), first time and all the time with economic viability considered at each stage of each process*."[4]

Oakland defines "TQM is an approach to improving the effectiveness and flexibility of business as a whole. It is essentially a way of organizing and involving the whole organization, every department every activity, every single person at every level."[5]

Definition of Total Quality Management by Foster and Whittle "TQM is the systematic analysis, but the focus is turning from a process driven by external controls through procedure compliance and enhancement to a process of habitual improvement where control is embedded within and is driven by the culture of the organization."[6]

According to Price and Chell "TQM is a management system, not a series of programs, it is a system that puts customer satisfaction before profit. It is a system that comprises a set of integrated

[1] Dale H. Besterfield. "*Total Quality Management Definition*" 2nd Edition, 1995, pg.123.
[2] International Organization for Standardization. "*Total Quality Management"* Geneva ISO *(ISO 8402:1994).*
[3] Adrian Wilkinson and Tom Wither. "Managing with total quality management: Theory and practice" Oxford: Blackwell, 1990, 1st Edition, pg. 2.
[4] Mohamed Zairi and Antonis Simintiras: "In *Total Quality Management for Engineers"* Oxford: Woodhead Publishing, 1st Edition, 1991, pg. 78.
[5] John S. Oakland: In his book "*Total Quality Management: Text with Cases*" New York: Routledge, 2014, 4th Edition, pg. 25.
[6] S. Thomas Foster and Stephen G. Whittle: In "*Managing Quality: Integrating the Supply Chain*" Upper Saddle River, NJ: Pearson 2012, 5th Edition, p. 66.

philosophies, tools, and processes used to accomplish business objectives by creating delighted customers and happy employees. ”

Peter Drucker defines “Quality in a product or service is not what the supplier puts in. It is what the customer gets out and is willing to pay for.”[1]

By taking into account the different definitions and combining the different perspectives, “***TQM can be defined as an approach to the identification, delivery and control of quality within organization***”.

It is a tried and tested method, highly in demand in today's workforce, which sees a company placing quality at the core of its overall operation strategy with the aim of achieving long-term success through integrating quality into every aspect of an organization’s operations, ensuring that products and services consistently meet or exceed customer expectations.

1.2: History and evolution of TQM

The history of TQM began initially as a term coined by the Naval Air Systems Command to describe its Japanese-style management approach to quality improvement of after World War II. Before the 1950s, approaches to quality were focused on quality control and statistical process control.

In the 1950s, W. Edwards Deming having been invited by Joseph Juran, returned to Japan to teach statistical analysis and quality control methods to Japanese engineers and executives, who were yearning for new ideas to help them correct serious and persistent quality problems. This can be considered the origin of TQM[2]. Joseph M. Juran taught the concepts of controlling quality and managerial breakthrough. By 1968, the Japanese named their approach to total quality "*enterprise quality control*". It is around this time that the term quality management systems arises.

In the1980s, the Baldrige National Quality Program and Malcolm Baldrige National Quality Award were established by the U.S. Congress and also the ISO 9000 standard was first published by the International Organization for Standardization (ISO) to help businesses ensure their

[1] Peter Drucker: According to Drucker: “*It is not what you may think*” (HRE Exchange Network)
[2]Deming, W. E. (1986). Out of the Crisis (p. 309). MIT Press, p. 309

products meet customer expectations and regulatory requirements (1987).TQM became a popular framework for improving quality and production processes across industries.

Today, TQM is the name for the philosophy of a broad and systemic approach to managing organizational quality, but the term has fallen out of favor as international standards for quality management have been developed. More modern applications of its principles and processes are found in concepts like quality management systems, quality standards such as the ISO 9000 series and quality award programs such as the Deming Prize and the Malcolm Baldrige National Quality Award[1]

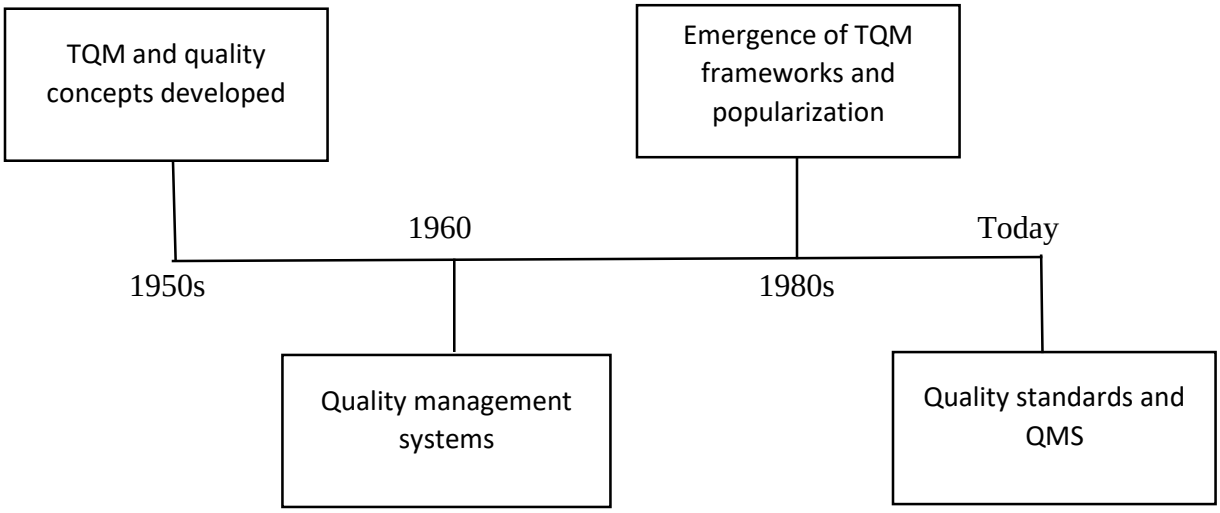


Fig 1: Illustration of the history and evolution of TQM[2]

1.3: Core Principles of TQM

TQM has a set of guiding principles which aid organizations to maintain a culture of continuous improvement and customer satisfaction. These principles ensure that quality is not just a goal but an ongoing process within daily operations of an organization. The core principles of TQM include the following:

[1] History of Quality. ASQ: American Society for Quality, "https://asq.org/quality resources/history-of quality?srsltid=AfmBOorpz_6NkO60KqTDsO47SuBa_KMPBgLEmOFSpxFfmb7ScV 922wB_&utm_source". Accessed 14 April,2025.

[2] Total Quality Management (TQM). ASQ: American Society for Quality, "https://asq.org/quality-resources/total-quality-management". Accessed 18 April 2025.

- ✓ Customer Focus: The primary goal of TQM is to understand, fulfill and exceed customer needs and expectations. Organizations need to prioritize customer feedback so as to enhance quality and satisfaction through understanding customer needs and providing products or services that deliver value.
- ✓ Employee Involvement: Engaging employees at all different levels to actively participate in quality improvement efforts creates a system of accountability, innovation and teamwork.
- ✓ Process Approach: TQM emphasizes understanding, managing and improving processes to achieve desired results. It focuses on efficiency and effectiveness in the operations of an organization. Organizations streamline workflows and standardize the best practices to achieve consistency and efficiency.
- ✓ Data-Driven/fact-based Decision-Making: The organization makes decisions based on accurate data and objective analysis rather than assumptions. Statistical tools, quality management methods, reliable data and performance metrics can aid in improvements and help in identifying areas for enhancement.
- ✓ Integrated system: TQM integrates all organizational systems and processes to work toward common quality objectives. Goals are aligned across teams to ensure coherence and collaboration.
- ✓ Strategic and systematic approach: The quality management system is aligned with the organization's strategic goals and is consistent with long-term objectives.
- ✓ Continuous Improvement: TQM promotes an ongoing commitment to refining processes, reducing errors and enhancing efficiency. Incremental enhancements and innovative changes contribute to overall quality.
- ✓ Communications: Communication is the backbone of the principles of TQM all together, ensuring smooth implementation and promoting a framework of quality throughout the organization. It nurtures a shared vision, encourages employee engagement, promotes transparency, and enhances collaboration.

1.4: Purpose, importance and benefits of TQM

Since TQM is more than just a set of tools or techniques rather a long-term approach to success, we have to discuss its purpose, benefits and importance. Understanding the purpose and

importance of TQM helps organizations realize how quality impacts of every part of operation. The benefits of TQM both tangible and intangible make it a vital strategy in today's competitive and quality-driven business environment.

1.4.1: Purpose of TQM

Since TQM is a management approach which emphasizes continuous improvement in all aspects of an organization, striving to enhance customer satisfaction, reduce waste and improve efficiency, the main purpose of TQM is to create a tradition of quality where every employee is involved in improving processes, products and services. Other purposes include reducing defects and errors in products and services, improving customer satisfaction through consistent quality, reducing waste and optimizing resource utilization, enhancing organizational culture by fostering teamwork.

1.4.2: The importance of TQM

- Customer Satisfaction: TQM helps ensure that products and services meet or exceed customer expectations, leading to higher customer satisfaction and loyalty.
- Improved Efficiency: By priotizing continuous improvement, TQM reduces inefficiencies, waste and errors which results into lower costs and higher productivity.
- Employee Engagement: TQM encourages employee involvement and teamwork, fostering a sense of ownership and responsibility for quality.
- Competitive Advantage: Organizations that utilize TQM can produce higher-quality products at lower costs, helping them stand out in the market.
- Better Decision-Making: TQM relies on data-driven decision-making, reducing guesswork and enhancing strategic planning.

1.4.3: The benefits of TQM in the improvement of quality and efficiency of an organization.

- Continuous Improvement: Encourages regular evaluation of processes to identify and fix inefficiencies.
- Process Standardization: Helps organizations implement standardized processes to reduce variability and improve consistency.

- Quality Control & Assurance: Ensures that defects are minimized through rigorous quality checks and preventive measures.
- Employee Training & Development: Provides employees with the necessary skills to maintain and enhance quality standards.
- Customer-Centric Approach: Keeps customer needs at the center of operations, leading to better products and services.

1.5: The Concepts of TQM

There are various concepts that make up the heart of an effective TQM program. These concepts share some similarities with the core principles of TQM but if deeply analyzed, the differences can be identified. Adopting these concepts helps organizations to improve efficiency, reduce waste and enhance overall performance. These concepts not only boosts competitiveness but also fosters innovation and long-term growth. By effectively applying these concepts, organizations achieve operational excellence and sustain a competitive advantage in today's dynamic market. These concepts of TQM include:

1.5.1: Continuous improvement

This represents the progressive, ongoing and steady improvement of all processes within an organization. All processes within the organization are taken into account as they all require unceasing improvement for the smooth operation of an organization. This improvement is an ongoing or recycling process. These processes include management, operational, development, support, regulatory, customer orientation processes among others. It also involves operation and work centers which include suppliers, customers, equipment and materials.

For successful implementation of the continuous improvement concept, we can decide to use the Walter Shewarts PDCA (Plan, Do, Check and Act) model. This model was also utilized by W. Edwards Deming in Japan after the WWII. Below is a simple illustration explaining the PDCA model.

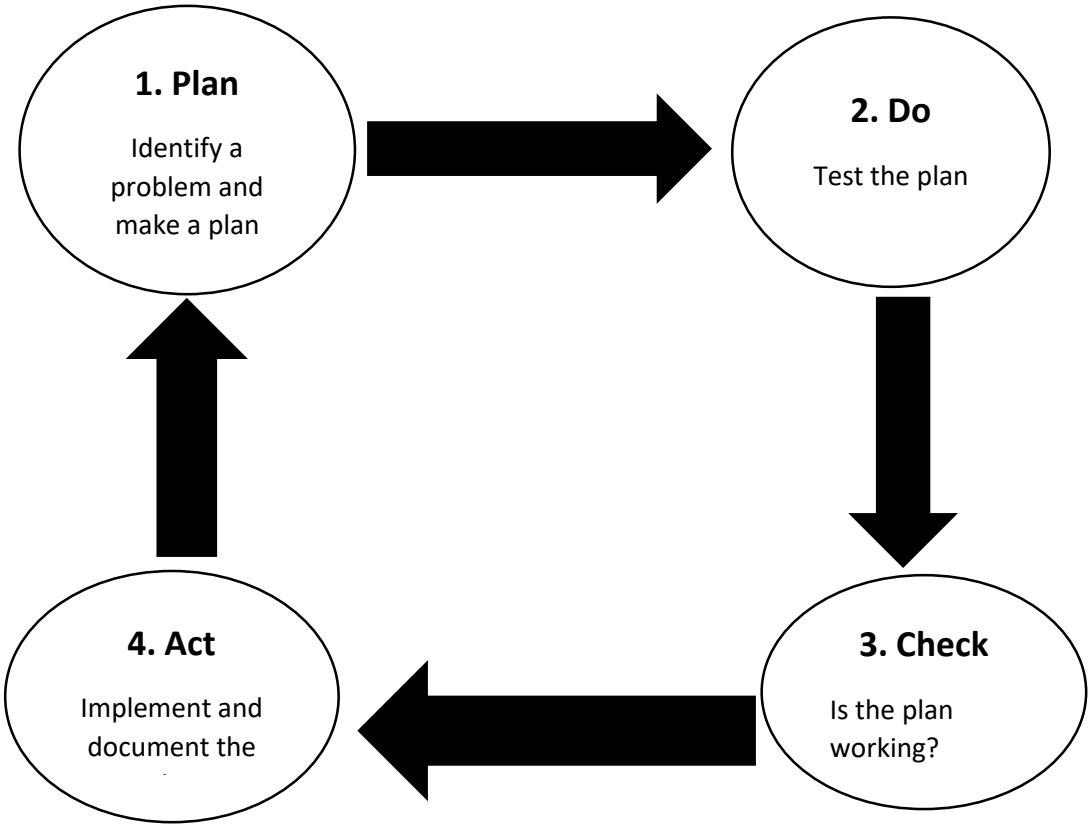


Fig 2: The PDCA (Plan, Do, Check and Act) model [1]

1.5.2: Six sigma (6 σ)

The term Six Sigma originates from statistical quality control, referencing to the fraction of a normal curve that lies within six standard deviations of the mean, which is used to represent a defect rate. Six sigma is a set of techniques and tools for process improvement. It was introduced by American engineer Bill Smith while working at Motorola in 1986. Six Sigma strategies seek to improve manufacturing quality by identifying and removing the causes of defects and minimizing variability in manufacturing and business processes. This is done by using empirical and statistical TQM methods (statistical six sigma) and by hiring people who serve in a program (six sigma

[1] Deming, W. E. "Out of the Crisis", MIT Press, 1986, pg. 88.

program) as six sigma experts. Each Six Sigma project follows a defined methodology and has specific: value targets, such as reducing pollution or increasing customer satisfaction[1].

Statistical six sigma is defined as a process that has the capability of 99.9997% of having no more than 3.4 defects in a million opportunities (DPMO). Defects can be identified as errors or mistake passed on to a customer which can also be referred to as non- conformance. DPMO can be calculated as follows

$$DPMO=\frac{V}{(E*U)}*1{,}000{,}000$$

DPMO: Defects per Million Opportunities

V: Number of defects/ errors

E: Number of opportunities for defects/errors per unit

U: Number of units

Six sigma program can be defined as a program designed to reduce costs, lower defects and improve customer satisfaction[2]. This program starts with hiring experts who are well versed in the operations of organization and then implementing a well-structured program for them to follow in order to lower defects and also improve production quality.

Methodologies of six sigma

There exist two methodologies of six sigma which include DMAIC methodology and also DMADV methodology.

DMAIC methodology is mainly used for projects whose objective is to improve an existing process in an organization. It is carried out in five phases where we have to:

- Define the process, the needs of the customer and their requirements and the project goals,
- Measure key aspects of the current process and collect relevant data,

[1] Kenton, Will. A Guide to Six Sigma and the Black Belt Certification. Investopedia, "https://www.investopedia.com/articles/investing/102014/guide-six-sigma-black belt.asp". Accessed 28 May 2025.

[2]Harry, M., & Schroeder, R. "The Breakthrough Management Strategy Revolutionizing the World's Top Corporations", 2000, pg. 25–30

- Analyze the data to investigate and verify the causes and effects of the defects,
- Improve or optimize the current process based upon data analysis using various techniques,
- Control the future, identify the process to ensure that any deviations from the target are corrected before they result in defects, implement control systems, and continuously monitor the process.

This process is repeated until the desired quality level is obtained.

DMADV methodology is mainly used for projects whose objective is to create new product or process designs. The DMADV methodology's five phases require us to:

- Define objectives that are consistent with customer demands and the strategy of the organization,
- Measure and identify the product capabilities, production process capability, and measure risks,
- Analyze to develop and create alternatives options,
- Design an improved alternative, best suited per analysis in the previous step,
- Verify the design, set up pilot runs, implement the production process and hand it over to the process owner(s).

1.5.3: Employee empowerment

Employee empowerment is defined as the different ways in which organizations provide their employees with a certain degree of autonomy and control in their day-to-day activities within the organization. This can include having a voice in process improvement, helping to create and manage new systems and tactics, and running smaller departments or projects with less oversight from higher-level management.[1]

A key principle of employee empowerment is providing employees with the means to make important decisions and then helping ensure those decisions and actions are improved continuously. When deployed properly, empowered employees can build stronger organizational

[1] Indeed Career Guide, 12 Benefits of Empowering Employees, "https://www.indeed.com/career-advice/career-development/benefits-of-empowering employees". Accessed 22 April 2025.

cultures, improve supplier relations, increase productivity, and promote a sense of work-life balance.

1.5.4: Benchmarking

Benchmarking is defined as the process of measuring products, services, and processes against those of organizations known to be leaders in one or more aspects of their operations. Benchmarking provides necessary information which help the organization understand how it compares with similar organizations, even if they are in a different business or have a different group of customers. Benchmarking can also help organizations identify areas, systems, or processes for improvements.[1]

1.5.5: Just-In-Time (JIT)

This is a production and inventory management technique that aims to minimize waste and maximize efficiency by producing and delivering products or services exactly when they are needed. The core concept of JIT is to eliminate any form of waste, including excess inventory, overproduction, waiting time, unnecessary movement and defects. By synchronizing production processes with customer demand, JIT reduces inventory carrying costs, minimizes lead times and improves overall responsiveness. It emphasizes a pull-based system, where production is triggered by actual customer orders, rather than pushing products into the market. JIT requires close coordination and collaboration between suppliers and manufacturers to ensure timely delivery of raw materials and components.

An example of an area where JIT is used is the hotel and restaurants which prepare and serve meals after a customer places an order.

1.6: ELEMENTS OF TQM

TQM consists three elements which include:

1.6.3: Focusing on customers

It is important to identify the organization customers. Focusing on customers is essential for any organization aiming to achieve long-term success, especially within the framework of TQM.

[1] ASQ: American Society for Quality, Benchmarking, “https://asq.org/quality resources/benchmarking”. Accessed 15 May 2025.

Identifying the organization's customers whether they are direct consumers, clients, or internal stakeholders sets the foundation for understanding what drives value and satisfaction. The needs and expectations of these customers determine the level of quality required, which in turn guides the organization's processes, products, and services.

Understanding the ultimate level of customer satisfaction involves gathering feedback and continuously engaging with customers to track changes in preferences, pain points and desires. Organizations that fail to identify and understand their customers risk investing resources in improvements that do not enhance the customer experience or, worse, could even be irrelevant to them. A customer-focused approach allows organizations to design products and services that not only meet current expectations but also anticipate future needs. This commitment to customer-centric quality improvement ensures that the organization delivers real value, maintains customer loyalty and stays competitive in an ever-changing market[1].

1.6.2: Involving employees

Employee involvement is a fundamental element of TQM and plays a critical role in achieving organizational success. The concept revolves around engaging all employees across every level of the organization in the pursuit of a common goal, typically improving product quality, operational efficiency and customer satisfaction. This inclusive approach recognizes that every individual, regardless of their role, can contribute valuable insights, ideas and efforts towards quality improvement. Employee involvement not only boosts morale but also empowers individuals to take ownership of their work, fostering a sense of pride and accountability.

When employees are actively involved in decision-making, problem-solving and continuous improvement initiatives, they are more likely to understand the organization's goals and feel personally invested in its success. This collective commitment creates a culture of teamwork where individuals collaborate to identify issues, suggest improvements and support one another in achieving high standards. Involving employees in the process encourages innovation, as those closest to the work often have the best understanding of operational challenges and opportunities for improvement. Ultimately, by fostering a collaborative environment where every employee is

[1] Omachonu, V. K., & Ross, J. E. Principles of Total Quality, 3rd edition, 2004, pg. 45–48.

encouraged to contribute, organizations can unlock their full potential for quality enhancement and achieve sustainable success[1].

1.6.3: Continuous improvement

Continuous improvement (also known as Kaizen in Japanese), is a fundamental element of TQM that emphasizes the ongoing, incremental enhancement of processes, products and services. Rather than relying on drastic and one-time changes, continuous improvement focuses on making small, consistent adjustments that accumulate over time to create substantial progress. This approach involves regularly assessing current practices, identifying areas of inefficiency or waste, implementing improvements and evaluating their effectiveness. It is a cyclical, never-ending process aimed at enhancing quality, efficiency and customer satisfaction.[2]

Organizations actively seek opportunities for enhancement rather than waiting for problems to arise. This philosophy promotes a culture where employees at all levels are encouraged to contribute ideas and take ownership of improvement initiatives. Continuous improvement also requires well-built measurement systems to track progress, evaluate changes and ensure alignment with organizational goals. By embedding continuous improvement into the organizational culture, companies can adapt to evolving market conditions, enhance productivity and maintain a competitive edge over time.

[1] Lawler, E. E. III, Mohrman, S. A., & Ledford, G. E. Jr. Employee Involvement and Total Quality Management: Practices and Results in Fortune 1000 Companies 1st edition, 1992, pg. 23–27.

[2] Tenner, A. R., & DeToro, I. J. "Total Quality Management: Three Steps to Continuous Improvement" Addison-Wesley 1997. pg. 89–93.

Section 2: The TQM tools

In this section, we are going to discover that in order to support continuous improvement and effective total quality management, organization must rely on a variety of tools. These tools tend to help in the identification of problems, analyzing processes, monitoring of performances and fostering a culture of consistent outcomes. By the use of the right tools allows management in organizations to make informed decisions, solve problems or issues systematically and maintain high standards across all operations.

2.1: Definition of TQM tools.

TQM tools are techniques and methodologies used to analyze, control and improve quality in an organization. These tools help in problem-solving, decision-making and continuous improvement to enhance customer satisfaction and operational efficiency[1].

TQM depends resourcefully upon an arsenal of tools and tactics for scrutinizing operations, pinpointing dilemmas and driving perpetual refinement. These methodically administrate and optimize quality administration and workflows.

2.2: The different TQM tools

In this section, we shall see that TQM tools can be divided into 3 (three) different categories which include tools for generating ideas, tools for organizing data and tools for identifying problems. These different categories help us to systematically organize the various TQM tools into a simple and well organized folder/ approach for easy use. We shall also discuss each category in detail to identify its role in helping the organization optimize customer satisfaction and also operational efficiency,

2.2.1: Tools for generating ideas

These are tools that can be used to brainstorm, develop, invent, innovate or formulate ideas. These tools facilitate management to devise plans, encourage invention and innovation and also improve

[1] ASQ: American Society for Quality, Quality Tools, “https://asq.org/quality resources/quality-tools”. Accessed 26 May 2025.

the operation process within an organization. These tools include check sheets, scatter diagrams, cause and effect diagrams.

A) Check sheet.

A check sheet is a simple, structured form that is used to collect, record and analyze data. It helps in identifying patterns, trends, or areas for improvement, which can lead to generating ideas for improving quality. It consists of a list of problems and the number of occurrences indicated by tally marks.

From the perspective of a manager, the check sheet must be designed with precision, ensuring that it captures all relevant and necessary data without being overly complicated. This might include categories of data for example different types of defects, times of occurrence and responsible departments. For instance, in a manufacturing setting, a check sheet could be used to record the number of items with paint defects, categorized by defect type like drips, smears, uneven coating and shift timings.

However, in the case of a front-line employee, the check sheet should be intuitive and quick to fill out, without interrupting their workflow. If the process of recording information is cumbersome, the data collected will likely be incomplete or inaccurate, defeating the purpose of the exercise[1].

	Hours							
Defects	1	2	3	4	5	6	7	8
W	/	////		///	//	//	//	////
X	//		///	//	///			///
Y		/	/		/	///	///	///
Z	///	//	/	////	///		//	////

Fig 3: An illustration of a check sheet.

Here are some insights on how to generate an effective check sheets for TQM:

- Define the Purpose: Identify what you want to improve or monitor. In other words identify the goal or objective for creating the check sheet and design the check sheet based on the

[1] Juran, J. M., & Gryna, F. M.," Juran's Quality Control Handbook", 4th edition, New York, 1988, pg. 22.4–22.6.

goal or purpose. In the above illustration, our goal is to find the number of defects discovered per hour.

- Design the Check Sheet: Create a structured and easy-to-use sheet where data can be recorded consistently. The check sheet should be as simple as possible, making it easy for anyone to use without extensive training. This can include categories, time slots or specific attributes to be measured like defects.
- Collect Data: Record data over a period of time to ensure accuracy and reliability. Group similar items together to make analysis simpler and incorporate symbols or codes to represent common entries. This speeds up the data entry process and reduces errors. In the illustration we have used tallies to record the number of defects per hour.
- Analyze Data: Look for patterns, trends, or outliers that suggest potential areas for improvement. Consider how the data will be analyzed and ensure the format facilitates this analysis.
- Generate Ideas: Based on the analysis, develop ideas for quality improvement which may include: reducing defects, improving process efficiency, reducing the long working hours, increasing the number of workers.[1]

By using check sheets, organizations can easily identify areas for improvement, prioritize issues, and implement corrective actions effectively. They form the basis of building a culture of quality and continuous improvement within an organization.

B) Scatter diagram

A scatter diagram is a graphic presentation of the relationship between two variables. As a TQM tool, scatter diagrams are usually used to help identify potential correlations, trends, or patterns, making it valuable for root cause analysis and process improvement. By visually examining the correlation between variables, new insights and ideas for process improvement and innovation can be generated.

A scatter diagram is developed or generated by obtaining the table of raw data, determining the high and low values of each variable and plotting data points on a two-dimensional graph with one

[1] 7 Quality Control (QC) Tools Explained with Real-Life Examples. "https://www.qualitygurus.com/seven-quality-tools-check-sheet/?utm" Accessed 24 May 2025.

variable on the X-axis and the other on the Y-axis. After that we then analyzing the scatter diagram for patterns by visually inspecting the plotted points to determine if a relationship exists between the variables[1].

Types of pattern that can be discovered when using a scatter diagram.

- Strong, Positive Correlation: The value of Y clearly increases as the value of X increases.
- Strong, Negative Correlation: The value of Y clearly decreases as the value of X increases.
- Weak, Positive Correlation: The value of Y increases somewhat as the value of X increases.
- Weak, Negative Correlation: The value of Y decreases somewhat as the value of X increases.
- Complex Correlation: The value of Y appears to be related to the value of X, but the relationship is not smooth.
- No Correlation: For any value of X, Y can have both large and small values. It does not appear to be any particular relationship between X and Y[2].

An illustration of the different types of pattern on the scatter diagram.

[1] 7 Quality Control (QC) Tools Explained with Real-Life Examples. "https://www.qualitygurus.com/seven-quality-tools-check-sheet/?utm" Accessed 24 May 2025.
[2] Scatter Diagram – Definition, Purpose, Advantages, Examples. Learn QCTools, "https://learnqctools.in/scatter-diagram". Accessed 29 April 2025.

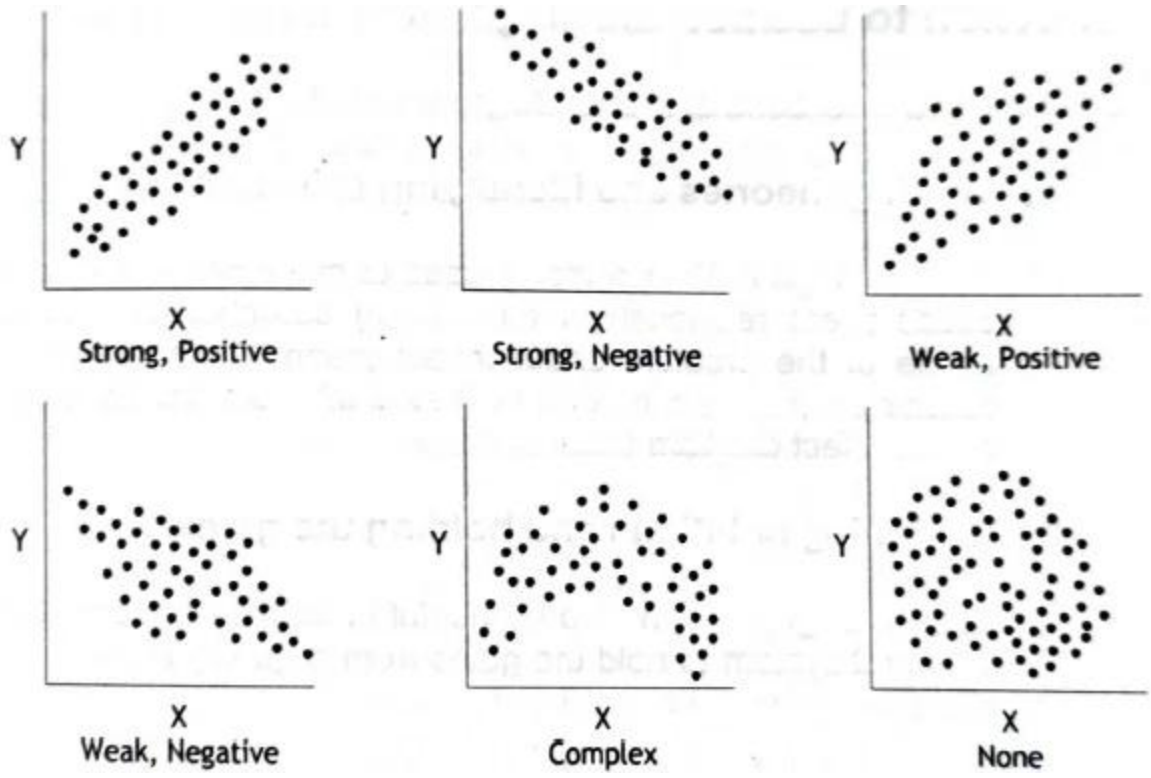


Fig 4: Scatter-diagram patterns[1]

By recognizing these patterns, organizations can generate targeted ideas for improvement. For example: if a positive correlation is found, enhance or amplify the factors contributing to improvement, if a negative correlation is detected, mitigate or control the adverse factors and if clusters or outliers are present, brainstorm ways to eliminate inconsistencies.

C) Cause and Effect diagram (Fishbone Diagram or Ishikawa Diagram)

This is a TQM tool used to identify, explore and display all possible causes related to a specific problem or effect. It helps teams brainstorm, categorize and analyze root causes. It can also be an excellent idea-generating tool within TQM. By consistently breaking down problems, it leads to development of ideas, creative solutions and improvement initiatives.

The purpose of the cause and effect diagram is to identify root causes of a problem contributing to factors for deeper analysis, organize ideas categorizing them into meaningful groups and facilitate

[1] Scatter Diagram – Definition, Purpose, Advantages, Examples. Learn QCTools, "https://learnqctools.in/scatter-diagram". Accessed 29 April 2025.

exploration of ideas to encourage comprehensive thinking about potential causes and their solutions[1].

How the cause and effect diagram works.

- Define the Problem (Effect): Clearly state the issue or quality concern at the head of the diagram.
- Identify Major Categories (Causes): Common categories in manufacturing can be labor (skills, training, and motivation), machine (equipment maintenance, technology), method (processes, procedures, and standards), material (quality, availability, and specifications), environment (working conditions, temperature, noise)
- Brainstorm the possible causes: Within each category, list potential causes contributing to the problem.
- Analyze and Prioritize: Identify the most likely root causes for further investigation.

An illustration of a cause and effect diagram an electronics plant is experiencing soldering rejects on printed circuit (PC) boards.

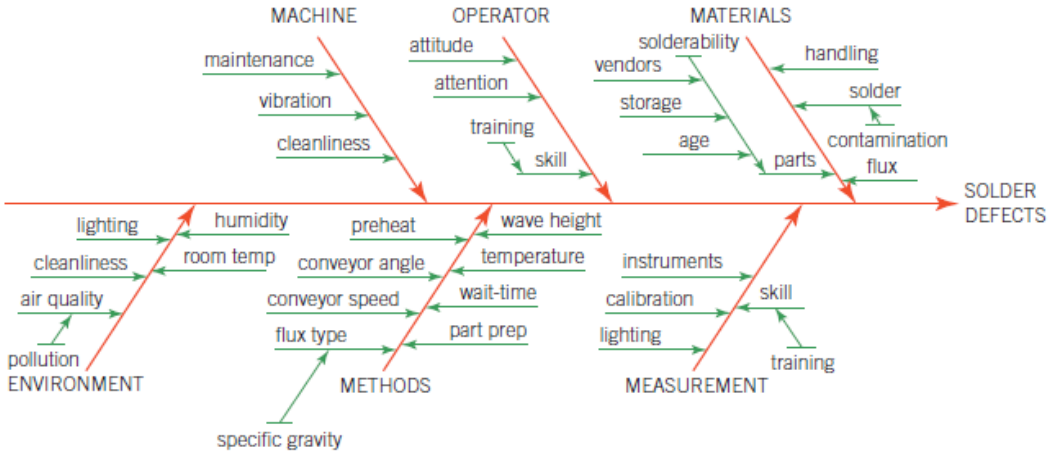


Fig 5: Completed cause and effect diagrams[2]

[1] Fishbone Diagram – QAPI Tools. Centers for Medicare & Medicaid Services (CMS), "https://www.cms.gov/medicare/provider-enrollment-and certification/qapi/downloads/fishbonerevised". Accessed 26 April 2025.

[2] Cause-and-Effect Diagrams as a Total Quality Tool. Phan Tran, "https://phantran.net/cause-and-effect-diagrams-as-total-quality-tool/". Accessed 30 May 2025.

The above illustration presents a picture of the major factors that can cause solder defects and also the smaller factors that affect the major factors. The examination of the materials rib shows that there are four factors directly affecting materials in regard to solder defects: the parts themselves, the handling of the materials and the solder and flux used in the process. The chart points out that contamination can affect the solder's performance and also that the big issue affecting the parts is solderability. In this case, the branches go to three levels from the rib, noting that solderability can be affected by the vendor supplying the parts, storage of the parts before use, and age of the parts.

A completed diagram reveals factors or relationships that had previously not been obvious, causes most likely responsible for the problem (solder defects) that will normally be isolated. Thus, the diagram may help in suggest possible solutions or ideas for solving the problem. It is conceivable in the example that a team, being familiar with the plant's operation, could say with some assurance that solderability was suspected because the parts were stored for long periods of time. They might recommend or advise that, by switching to a JIT system, both storage and aging could be eliminated as factors affecting solderability[1].

By encouraging a well-structured brainstorming and detailed cause analysis, the Cause-and-Effect Diagram serves as a critical tool for generating practical, data-driven ideas that drive continuous improvement.

2.2.2: Tools for organizing data

TQM relies on tools that help organize data for proper or easy analysis and interpretation. Organizing data properly allows for meaningful analysis, interpretation, better decision-making, and continuous improvement. The most commonly used TQM tools for organizing data are Pareto charts and flowcharts[2].

A) Pareto charts

A Pareto Chart is a powerful data-organizing tool used in TQM to prioritize problems, identify the most significant causes and focus improvement efforts effectively. It was developed by an Italian economist named Vilfredo Pareto thus the name Pareto Chart after him. It combines bar graphs

[1] Cause-and-Effect Diagrams as a Total Quality Tool. Phan Tran, "https://phantran.net/cause-and-effect-diagrams-as-total-quality-tool/". Accessed 30 May 2025.

and line graphs to highlight the most critical factors contributing to a particular issue. The bar that has the highest value falls into the left and the bar that has the lowest value falls into the right. The vertical axis on the left side represents the frequency of occurrence, costs or another measurement related to the survey. The vertical axis on the right side represents the cumulative percentages of the values shown in the left vertical axis[1].

These are steps that are followed to create a Pareto Charts.

- Decide the categories to be represented on the chart and decide the type of measurement to be used. Measurements may be cost, income, defects and quantity.
- Specify the time period for the chart (one day, one hour, one production period.)
- Collect data for each category or use the existing data.
- Specify the scale for measurements.
- Draw the vertical bars for each category and place the highest value on the left and the lowest value on the right.
- Draw the cumulative curve by calculating the percentages.

An illustration of a concrete plant and tested strength of the concrete samples. Concrete strength must be 30 Mpa and categorized the results as per below table.

Number Of Sample	Strength	Category
60	5 Mpa	Critical
40	10 Mpa	Very Important
30	20 Mpa	Important
15	25 Mpa	Less Important
5	29 Mpa	Unimportant

Fig 6: Pareto Chart Example

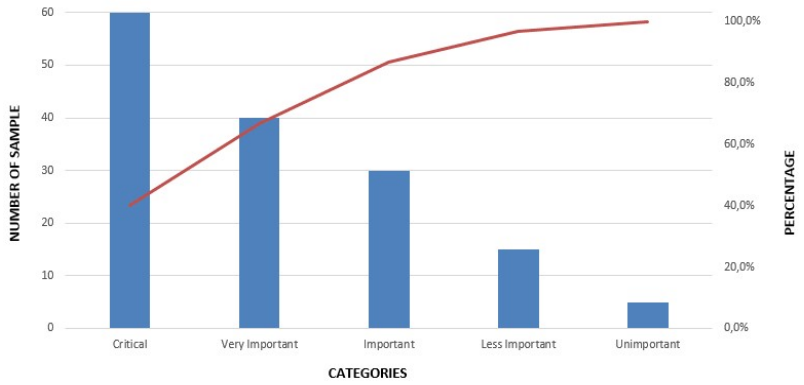
In order to draw the cumulative percentage line, we calculated the cumulative values as shown in the table below.

[1] Pareto Chart (Pareto Analysis). Project Cubicle, “https://www.projectcubicle.com/pareto-chart-pareto-analysis/”. Accessed 16 April 2025.

	Critical	Very Important	Important	Less Important	Unimportant
Totals	60	40	30	15	5
Percent	40,0%	26,7%	20,0%	10,0%	3,3%
Cum %	40,0%	66,7%	86,7%	96,7%	100,0%

Fig 7: Pareto Chart Example-Cumulative Values

By using the categories (strength) and the number of samples tested we can draw the Pareto chart as shown in the figure below.



Key;

: Number of Samples : Cumulative percentage line

Fig 8: Pareto Chart[1]

Through clear visualization and structured analysis, Pareto Charts enhance the ability of organizations to systematically address quality issues and achieve continuous improvement.

B) Flow chart

A flowchart is a picture representation of different steps of a process in sequential order. It is a TQM tool that can be adapted for a wide variety of purposes and can be used to describe various processes such as a manufacturing process, an administrative or service process, or a project plan.

[1] Pareto Analysis. Investopedia, "https://www.investopedia.com/terms/p/pareto analysis.asp". Accessed 14 April 2025.

It is essential tools for organizing and visualizing processes, ensuring clarity, efficiency and consistency.

The purpose of a flowchart is to visualize processes by providing a clear step-by-step representation of workflows, identify inefficiencies through highlighting bottlenecks, redundancies and areas for improvement and standardize operations by ensuring consistency and quality by documenting best practices.

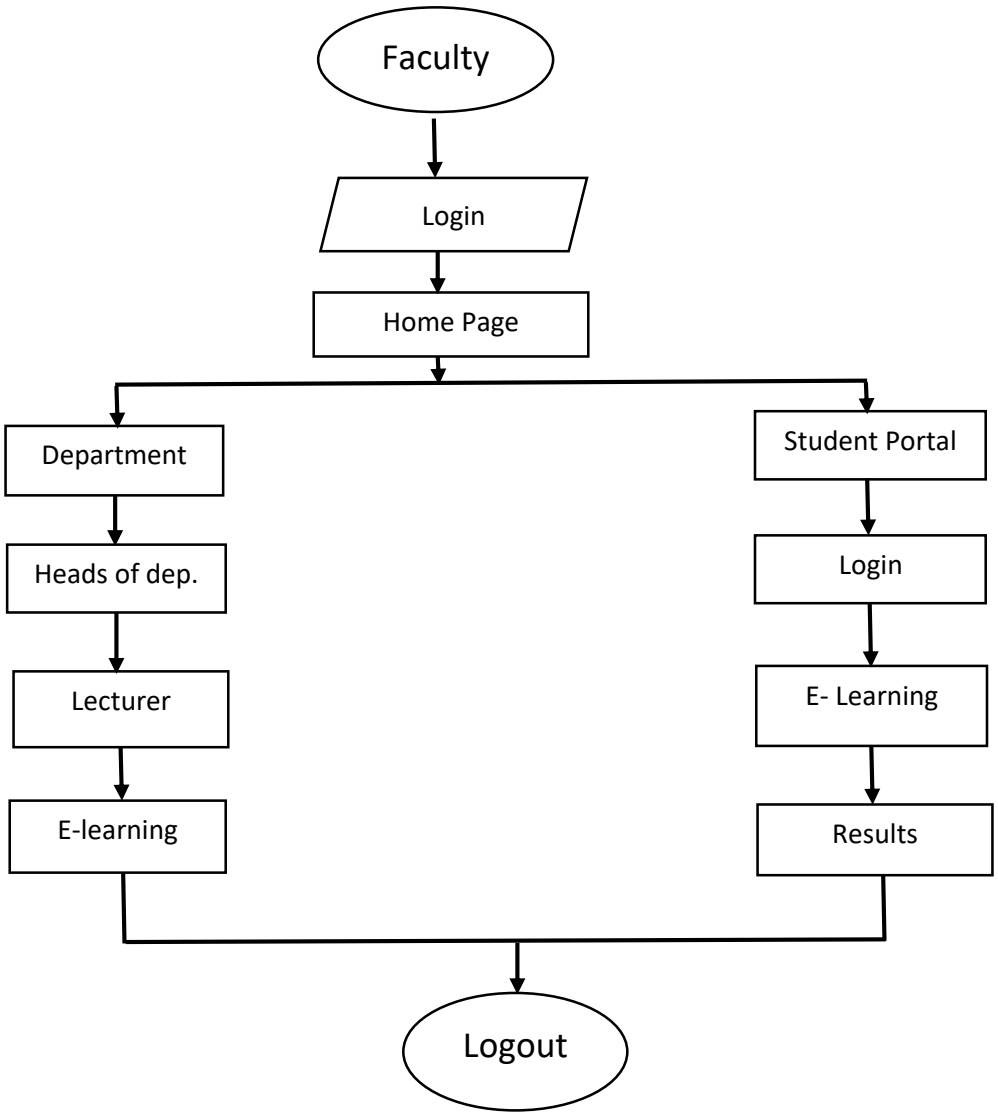


Fig 9: An illustration of a university faculty flowchart.

2.2.3: Tools for identifying problems

In TQM, problem identifying tools are essential instruments used to gather, analyze and interpret data to uncover the root causes of quality problems. These problem-identification tools are the most commonly used and most effective tools for both- identification of the quality problem as well as ideating for potential solutions to solve / circumvent the problem. They form the foundation of problem-solving and continuous improvement efforts within an organization. By identifying areas of weakness, inefficiencies, or defects, organization can make data-driven decisions aimed at enhancing quality and efficiency. These tools include histograms and control charts.

- **Histograms**

Histograms are bar graphs used to represent the distribution of a dataset by showing the frequency of data points within specified intervals or ranges. They are one of the tools commonly used in TQM for identifying patterns, variations and potential quality issues. They visual depiction of data distribution which help in the understanding of how data performs over a range of time intervals. Histograms offer a quick approach to identifying trends and outliers in data as well as identifying possible issues[1].

The purpose of histograms in TQM is to visualize process variation which help determine if a process is stable or if there are deviations from the expected range, identify patterns by revealing trends, clusters, or gaps in data which can indicate areas for improvement, compare against specifications through showing how data distribution aligns with acceptable quality standards or specifications and also facilitate root cause analysis thereby helping to identify abnormal variations that may require further investigation.

Effective histograms should be easy to understand and interpret, quickly visualized which makes it simple to identify patterns and anomalies, able to help to detect trends, great for analyzing data from processes that generate large amounts of numerical data, examine the distribution of process data over time, compare output from multiple processes, verify whether a process meets customer requirements.

[1] Histogram: Definition, Purpose, and How to Interpret. IZenBridge, "https://www.izenbridge.com/blog/histogram". Accessed 17 May 2025.

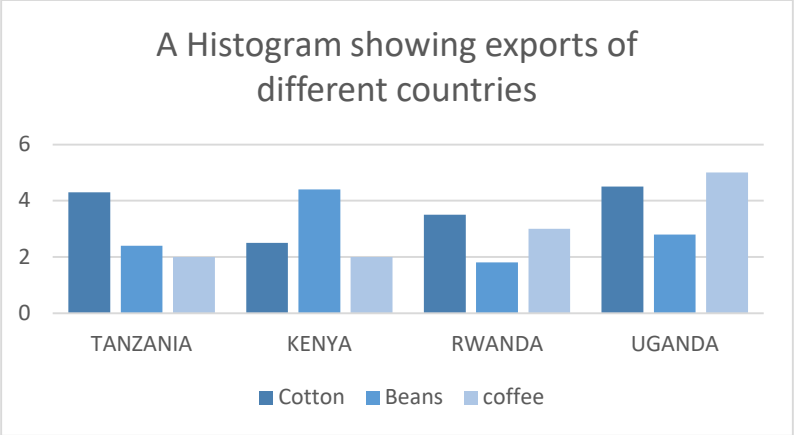


Fig 10: An illustration of a histogram

- **Control chart**

A control chart also known as a Shewhart Chart or Process Behavior Chart, is a graphical-statistical tool used to monitor, control and improve processes over time. It helps identify whether a process is stable (in control) or unstable (out of control) due to special or common causes of variation. It is a vital instrument for identifying and eliminating quality problems in Total Quality Management. It consist of a central line that represents the average or target value of the variable, and two control limits that define the acceptable range of variation[1].

A process is in control when the variation is due to common causes, such as random fluctuations or inherent factors. A process is out of control when the variation is due to special causes, such as errors, defects, or changes in the system.

A control chart serves as a vital tool for monitoring process stability, distinguishing between common and special causes of variation, setting quality standards, facilitating continuous improvement, predicting future performance, aiding in communication and decision-making and supporting employee training. By visually representing process data over time, control charts empower organizations to proactively manage quality, identify areas for improvement, and foster a culture of continuous learning and enhancement.

[1] Control Chart. ASQ: American Society for Quality, “https://asq.org/quality resources/control-chart”. Accessed 23 April 2025.

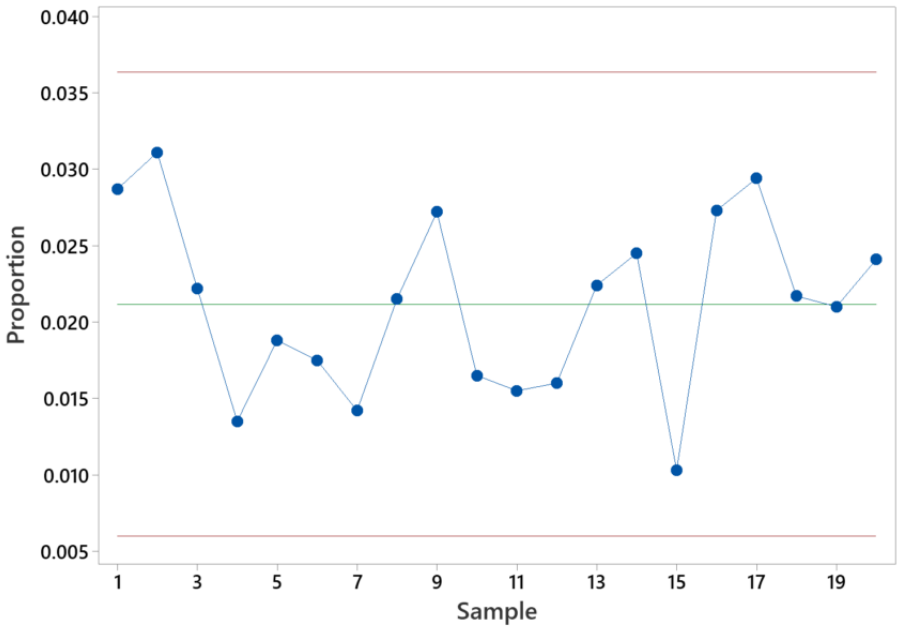


Fig 11: Control chart[1]

In Conclusion, TQM tools are essential instruments that enable organizations to systematically improve processes, enhance quality, and increase overall efficiency. By embracing these tools, organizing can establish a strong foundation for continuous improvement and a culture of excellence. Each of these tools serves a specific purpose, from identifying root causes and detecting defects to analyzing process variations and visualizing data trends. When used in combination, these tools provide a comprehensive approach to identifying, analyzing, and solving quality-related issues.

Furthermore, these tools not only aid in defect reduction but also emphasize process optimization, risk assessment, and predictive analysis. The integration of these tools with traditional TQM techniques ensures a robust framework for achieving high-quality standards and maintaining customer satisfaction.

The successful implementation of TQM tools requires commitment from leadership, adequate training for employees, and a proactive approach to monitoring and refining processes.

[1] Laney P Chart vs. a 30,000-Foot-Level Report. Smarter Solutions, “https://smartersolutions.com/laney-p-chart-vs-a-30000-foot-level-report.html/”. Accessed 25 May 2025.

Organizations that leverage these tools effectively can anticipate enhanced productivity, reduced costs, higher customer satisfaction, and a stronger competitive edge.

Section 3: TQM implementation challenges and solutions.

Implementing TQM is a very comprehensive and transformative process aimed at improving quality across all organizational functions to achieve long-term success and customer satisfaction. TQM focuses on continuous improvement, employee involvement, customer satisfaction approaches and systematic process management. While the benefits of TQM are well-documented and widely recognized, the journey towards successful implementation is filled with numerous challenges. Organizations often face significant challenges during the implementation of TQM due to various factors.

Understanding these challenges is essential for organizations seeking to implement TQM effectively. By identifying potential obstacles early on, organizations can devise strategic plans to address them proactively, thereby enhancing the likelihood of successful implementation and sustainable quality improvement. In this section, we going to discuss these challenges faced in detail, identify their root cause and after offer the best solutions to the problem to aid organization improve quality and customer satisfaction.

3.1: The challenges organizations face in implementing TQM.

These challenges tend to slow down progress making it hard to achieve the required improvements. Identifying and addressing these obstacles is essential for successful TQM implementation.

- Resistance to Change

Employees may be reluctant to adapt to new processes and practices, especially if they feel their current methods are adequate and also often stems from a preference for familiar routines, comfort with established workflows, or skepticism about the efficacy of proposed changes. In some cases, employees view the changes as a threat to their job security, autonomy, or status within the organization. They may fear that new practices will increase their workload, require them to learn unfamiliar skills, or render their existing knowledge and expertise obsolete. Additionally, if employees believe their current methods are effective, they may be unwilling to alter their approaches without clear evidence of improvement.

In organizations where creativity and innovation are not encouraged, employees may be particularly hesitant to embrace new ideas or practices. And blame-oriented culture can discourage risk-taking and experimentation, both of which are essential for successful TQM implementation.

- Inadequate/ lack Training and Education

A lack of proper training can lead to poor understanding, inconsistent implementation, errors, inefficiency, and low-quality results because workers lacked the knowledge and skills needed to do their jobs properly. Additionally, untrained employees may fail to recognize opportunities for improvement or may apply TQM methodologies inconsistently across different department, resulting in fragmented efforts that do not align with the organization's overall quality objectives and also can negatively impact employee motivation and engagement.

- Ineffective Measurement Systems

Poorly designed metrics can fail to capture the real improvements brought about by TQM because quality metrics can be tricky to quantify due to their subjectivity and inherent variation from one person to the next. Furthermore, quality metrics may be affected by external factors such as market conditions, regulatory changes, or customer preferences.

- Insufficient resources and limited or budget Constraints

This means that organizations may lack the necessary funds or personnel to fully implement a quality management system. Without adequate funding, organizations may struggle to invest in essential training, process improvements or technology upgrades needed to support TQM initiatives. Furthermore, a lack of skilled personnel can lead to overburdened employees, lower morale and compromised quality standards. This resource deficiency can create a vicious cycle where poor quality leads to increased costs and also further straining the budget and undermining long-term improvements.

- Insufficient Communication and Coordination

Insufficient communication can result in confusion about goals, roles, and responsibilities. When information about goals, roles, and responsibilities is unclear or inconsistently conveyed, employees may feel disconnected from the organization's objectives. This lack of clarity can lead to misunderstandings, duplicated efforts, or missed tasks, ultimately compromising quality

standards. Additionally, insufficient communication can hinder collaboration across departments, preventing valuable insights and feedback from reaching decision-makers.

- Lack of Management Commitment

Without genuine support and active involvement from top management, TQM initiatives often fail to gain traction. When top management fails service to quality initiatives without actively participating or providing necessary resources, it sends a clear message that quality is not truly a priority. This lack of genuine support can demotivate employees, reduce accountability, and create resistance to change. Moreover, without strong leadership, efforts to establish a quality-centric culture are likely to be fragmented and unsustainable, leading to inconsistent practices across departments.

- Lack of Strategic Planning

This can severely undermine TQM initiatives by causing misalignment between quality improvement efforts and the organization's broader goals. Whenever TQM is implemented without a clear roadmap or initiatives may conflict with existing processes or fail to address critical areas that impact overall performance. Fragmented efforts often lead to wasted resources, inconsistent practices, and missed opportunities for improvement. Additionally, without a proper strategy, measuring progress and demonstrating the value of TQM becomes increasingly difficult, further discouraging commitment from leadership and employees.

- Short-term Focus

Organizations often abandon TQM efforts prematurely due to an excessive focus on immediate results rather than long-term improvement. This is because they prioritize quick wins over sustainable improvement often become frustrated when immediate results are not evident. This impatience can lead to the premature abandonment of TQM practices, especially when management feels pressure to demonstrate rapid returns on investment. Also the emphasis on short-term gains may encourage superficial fixes rather than addressing underlying issues, resulting in inconsistent quality outcomes and missed opportunities for deeper, lasting improvements.

- Unclear Roles and Responsibilities

This can significantly hinder the effectiveness of TQM by creating confusion and inefficiencies. In situations where employees are uncertain about their specific duties or how their work contributes to broader quality objectives of the organization, it can result in duplicated efforts, overlooked tasks, or conflicting priorities. This ambiguity not only wastes valuable resources but also undermines accountability, making it difficult to track progress or pinpoint areas for improvement. Furthermore, unclear roles can breed frustration and disengagement among employees, reducing their motivation to actively participate in TQM efforts.

- Lack of Customer Focus

This can critically undermine TQM efforts, as satisfying customer needs is at the heart of quality improvement. When organizations fail to understand or prioritize customer expectations, their processes and products may fall short of delivering true value. This disconnect can occur when companies rely solely on internal metrics or assumptions rather than actively seeking and incorporating customer feedback. As a result, TQM initiatives may improve operational efficiency without enhancing customer satisfaction, ultimately defeating the purpose of quality management.

In conclusion, implementing TQM presents numerous challenges that organizations must address to achieve lasting success. By proactively identifying and addressing these challenges, organizations can enhance employee engagement, ensure consistent application of TQM principles, and foster a culture that embraces quality improvement as an ongoing process. Ultimately, overcoming these barriers requires a strategic, well-coordinated approach that aligns TQM efforts with the organization's overall objectives. When implemented effectively, TQM can lead to significant improvements in productivity, customer satisfaction, and overall organizational performance.

3.2: Solutions to the problems

To address resistance to change, organizations must focus on effective communication, employee involvement, and leadership support. Provide adequate training that demonstrates the benefits of

TQM and recognize employee contributions which helps to overcome resistance and foster a positive attitude toward continuous improvement.

Organizations must invest in comprehensive and ongoing training programs tailored to their unique needs to check inadequate training and education. These programs should cover both foundational TQM concepts and the specific tools and techniques relevant to the organization's industry and operational processes. Providing hands-on learning opportunities through workshops, simulations, or real-world projects can significantly enhance employees' understanding and application of TQM principles.

Organizations should develop well-rounded approaches to designing their measurement systems. This involves developing metrics that are aligned with strategic goals, easy to understand, and capable of providing actionable insights. They should also incorporate both qualitative and quantitative aspects that can offer a balanced perspective on improvements.

Regularly reviewing and refining the measurement systems based on feedback, evolving business needs and external factors like market conditions ensures their continued relevance. This continuous improvement approach ensures that measurement systems remain aligned with organizational goals and accurately reflect performance in a dynamic environment.

Organizations should prioritize resource allocation by focusing on high-impact areas of TQM that offer the greatest return on investment. This strategic planning and phased implementation can help spread costs over time, making improvements more affordable. By efficiently managing available resources and continuously evaluating their allocation, organizations can sustain TQM efforts

Investing in training and developing existing employees can enhance skill sets without requiring significant hiring efforts. This approach also boosts employee morale and engagement, contributing to a more capable and motivated workforce.

Establishment of clear, consistent, and transparent communication channels at all levels. Implementing regular meetings, updates, and feedback ensures that everyone stays informed and aligned with TQM objectives. Additionally, fostering an open culture where employees feel encouraged to share ideas and raise concerns can enhance collaboration and innovation.

Management should lead by example, embodying the principles of continuous improvement and fostering an open environment where employees feel empowered to contribute to quality goals. Consistent involvement and communication from leadership can transform TQM from a theoretical concept into a practical, organization-wide effort.

Integration of TQM into the strategic planning process of organizations. This involves clearly defining quality objectives that align with the organization's vision, mission and long-term goals. Developing a comprehensive roadmap with measurable milestones ensures that TQM efforts are purposeful and well-coordinated. Regularly reviewing progress and adjusting strategies as needed helps maintain alignment even as business conditions evolve.

Adoption of a long-term perspective by setting realistic expectations and establishing gradual, measurable milestones that align with their strategic goals. Encouraging a culture of continuous improvement and patience is essential, supported by consistent communication from leadership emphasizing the importance of enduring progress over immediate results. Tracking both short-term achievements and long-term benefits through well-designed metrics can help demonstrate the cumulative value of TQM over time. By balancing short-term objectives with a commitment to sustained improvement, organizations can enhance their resilience and achieve more meaningful, lasting success.

Establishment of clear, well-defined roles and responsibilities that align with the TQM objectives set by the organization. This involves creating detailed job descriptions, process maps, and accountability charts that outline individual and team expectations. Leaders should also encourage collaboration across departments to promote a shared commitment to quality. By fostering transparency and clarity in roles, organizations can enhance coordination, efficiency, and engagement in their TQM processes.

Organizations must place customer needs at the forefront of their TQM strategies. Regular gathering and analyzing customer feedback through surveys, interviews, and market research ensures that improvement efforts are aligned with evolving expectations. Integrating customer satisfaction metrics into performance evaluations and decision-making processes helps maintain focus on delivering value. Encouraging cross-functional teams to collaborate on enhancing customer experiences can also promote a holistic approach to quality.

In conclusion, implementing TQM is a complex and ongoing process that requires careful planning, commitment, and collaboration across all levels of an organization. By fostering a culture of continuous improvement, providing employees with the necessary tools and education, and establishing clear roles and responsibilities, organizations can overcome these obstacles and unlock the full potential of TQM. Ultimately, overcoming these challenges not only improves product and service quality but also enhances customer satisfaction, employee engagement, and overall organizational performance. Commitment to continuous improvement and adaptability will ensure that TQM remains a vital and effective tool for achieving sustainable success.

Conclusion

This chapter provided a comprehensive exploration of Total Quality Management (TQM) as a holistic approach to improving organizational performance through continuous improvement and customer satisfaction. It highlighted the core principles of TQM which are foundational to building a quality-driven organizational culture. These principles were examined in the context of their pivotal role in fostering long-term organizational success. The chapter also delved into various TQM tools each of which serves a unique function in optimizing processes, minimizing defects, and ensuring alignment with customer needs. The integration of these tools is essential for organizations to achieve consistent quality and meet evolving market demands.

Moreover, the chapter explored the common challenges that organizations face when implementing TQM. These obstacles, while significant, can be overcome through strategic interventions. By understanding and addressing these challenges, organizations can foster an environment where TQM practices are embedded at all levels, ensuring sustained improvements in product and service quality. Overall, the findings in this chapter provide valuable insights for organizations looking to adopt and maintain effective TQM practices, paving the way for long-term operational excellence and customer satisfaction.

CHAPTER 2:

THE IMPLICATIONS OF INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO) ON MANAGEMENT

Introduction

ISO (International Organization for Standardization) standards are globally recognized guidelines and frameworks that help to ensure products, services, and systems are safe, reliable and of high quality. They are developed through the collaboration of experts from various industries and countries, with the goal of harmonizing cross borders and cross industry practices to foster trade, improve efficiency and protect the environment. They also cover a variety of fields for example quality management, environmental management, information security and more. These standards can be applied to organizations of all sizes and sectors, from large corporations to small and medium enterprises.

In this chapter, we will be discussing various aspects of ISO standards. This will include their history and development, the different types applied by management in different organizations, the roles of different actors, the certification process and their impact on management functions. By the end of this chapter, we will have developed a deeper understanding of the ISO standards.

Section 1: The Overview of ISO standards.

Today, businesses are spread throughout different continents and use different technologies to conduct their business. But they all require similar standards to carry out business across borders. Standardization (establishment of requirements for products and systems) has a crucial role of ensuring safety, consistency, quality and reliability. All sectors (manufacturing, health, IT or energy) globally tend to base on these standards to improve efficiency, cut costs, and carry out innovations and also all the different types of systems can work together easily.

As progress in the world of globalization and technological development, these standards have experienced a sharp increase in their implementation among very many organizations. Without them, businesses are likely face very many challenges. Standardization helps break down these barriers, supporting global trade and fostering economic cooperation.

This section will take a closer look at the ISO standards i.e. its history and development, the different types applied by management in different organizations, the roles of different actors, the certification process and their impact on management functions. By the end of this chapter, we

will have developed a deeper understanding of the ISO standards and also appreciate its vital role in shaping the modern, interconnected world.

1.1: History and evolution of ISO.

ISO was founded on 23rd February 1947 from two independent organization, “International Federation of the National Standardizing Associations (ISA)” and “United Nations Standards Coordinating Committee (UNSCC)” having headquarter in Geneva, Switzerland. This came after a meeting held in October 1946 in London by delegates from 25 countries where discussions were held and an agreement was reached to join the two organizations[1].

The name ISO stands for the International Organization for Standardization, but it is not an acronym. It is derived from the Greek word "isos" (ἴσος), which means "equal"[2]. This term was chosen to reflect the organization's core principle of promoting equality and uniformity through global standards. The idea of "equal" captures the essence of the standardization process.

The standardization process started from World War II, when the allied forces needed unified standards for materials, ammunitions and tactics and also for exportation of military equipment by the British army and other military companies[3]. This helped different countries coordinate more effectively in combat and logistics.

These processes included the American military standardization like the MIL-Q-9858A specification issued by the U.S. Department of Defense on December 16, 1963 to establish comprehensive quality program requirements for defense contractors, the NATO standardization STANAG 4082, issued on May 28, 1969, which provided a uniform format for meteorological data, the American Society of Mechanical Engineers established ASME Y14.7.1 in 1971 which provided detailed guidelines for drafting gears operating on parallel axes, American Petroleum Institute standardization AP Spec Q1 specifically for the petroleum and natural gas industry that provided requirements for organizations involved in the design, manufacturing and servicing of

[1] “A History of Management Thought” by Morgen Witzel, 2012, pg: 273
[2]About Us. International Organization for Standardization (ISO), “https://www.iso.org/about-us.html”. Accessed 14 May 2025.
[3] “A History of Engineering and Technology”: Artful Methods by Ervan G. Garrison, 1998, pg: 312–314 military logistics and the birth of standardization

products used in the sector, the British standardization BS 5750 which provided a framework for managing quality in a range of industries[1].

In 1987, ISO through "the Big Deal", released the first unified internationally recognized quality management system (QMS) standard (the ISO 9000 series) basing on earlier national standards like BS 5750 from the UK[2]. It provided a unified structure to ensure consistent product and service quality across industries and countries. This paved way for the release of other standards like the ISO 14000 series (Environmental Management Systems (EMS)) in 1996 and ISO 27000 series (information security management) in 2005 among others.

The digitalization and the internationalization period (1990-2000) marked the use of ICT (technologies) led to the development and publishing standards. Organizations during this period focused mainly on inclusiveness and sustainability in the development process. Currently, organizations are in the "sustainability and innovation period" and have started integrating AI (Artificial Intelligence) in their developing process. This has led to adoption of flexible specifications that suit the different sizes and objectives of organizations.

Currently, there are 174 national members representing ISO in their country, with each country having only one member. ISO's membership is categorized into three distinct types which include;

- Full Members (Member Bodies)

Full members are national standards bodies that represent their respective countries within ISO. They possess comprehensive rights and responsibilities. There are 129 full member countries like Algeria, Uganda, Mali, USA, UK, Argentina, Croatia and Denmark among others.

- Correspondent Members

Correspondent members are countries that may not have fully developed national standards bodies but wish to stay informed about ISO's work. This membership category allows countries to monitor ISO's activities and prepare for potential full membership in the future. It is comprised of 41 countries which include Angola, Albania, Zambia, Sierra Leon and Seychelles among others.

[1] Quick Search. Defense Logistics Agency, "https://quicksearch.dla.mil/". Accessed 27 April 2025.
[2] International Organization for Standardization (ISO) ,ISO 9001 Quality Management, "https://www.iso.org/iso-9001-quality-management.html". Accessed May 2025.

- Subscriber Members

Subscriber members are typically nations with smaller economies or limited resources. This category provides a foundational engagement with ISO, enabling countries to build their standardization capacities over time. Some of the subscriber members include countries like Antigua and Barbuda, Honduras and Saint Vincent, the Grenadines and Belize.

1.2: Structure of governance

ISO is a voluntary, independent, non-governmental international organization that develops and publishes standards across various industries and whose members are recognized authorities on standards, each one representing one country. Members meet annually at a General Assembly to discuss the strategic objectives of ISO. The organization is coordinated by a central secretariat based in Geneva[1]. Its governance structure is designed to ensure effective coordination and management of its global standardization activities.

The primary components of this structure include the General Assembly, the ISO Council, the Technical Management Board (TMB), and numerous Technical Committees (TCs) and Sub-Committees (SCs).

1.2.1: General Assembly

The General Assembly serves as ISO's highest authority and convenes annually. It comprises representatives from ISO's member bodies and the organization's principal officers. The General Assembly is responsible for determining ISO's strategic objectives, overall direction, approving the annual budget and the appointment of key officials[2].

1.2.2: ISO Council

Reporting to the General Assembly, the ISO Council acts as the core governance body. It consists of 20 member bodies, ISO Officers and the Chairs of the Policy Development Committees: CASCO (Conformity Assessment), COPOLCO (Consumer Policy), and DEVCO (Developing

[1] "Structure and governance". International Organization for Standardization. Archived from the original on 19 September 2012, retrieved on 08 April 2025

[2]"Structure of ISO." International Organization for Standardization (ISO), “https://www.iso.org/structure.html”. Accessed 17 April 2025.

Country Matters). Membership in the Council rotates to ensure broad representation of the ISO community.

The Council meets three times a year and oversees several committees and advisory groups, including:

- ✓ President's Committee: Advises the Council on matters decided by the Council.
- ✓ Council Standing Committees: Address issues related to finance, strategy and policy, nominations for governance positions, and governance practices oversight.
- ✓ Advisory Groups: Provide advice on commercial policy and information technology.

1.2.3: Technical Management Board (TMB)

The TMB comprises the ISO Vice-President (Technical Management) and 15 elected member bodies, including permanent members. The TMB manages ISO's technical work and reports directly to the Council. Its responsibilities include:

- ✓ Establishing and dissolving Technical Committees (TCs).
- ✓ Appointing TC chairs.
- ✓ Monitoring the progress of technical work.
- ✓ Overseeing the development and maintenance of the ISO/IEC Directives, which outline procedures for standards development.
- ✓ Strategic planning and coordination of technical committee activities.

1.2.4: Technical Committees (TCs) and Subcommittees (SCs)

ISO's standards development is conducted through over 700 Technical Committees and Subcommittees, each focusing on specific areas of standardization. These committees are responsible for drafting and revising standards within their respective domains. Each TC is assigned a secretariat, typically held by a national standards body, which manages administrative tasks and coordination. The TMB approves the establishment of TCs, appoints their chairs, and monitors their work progress.

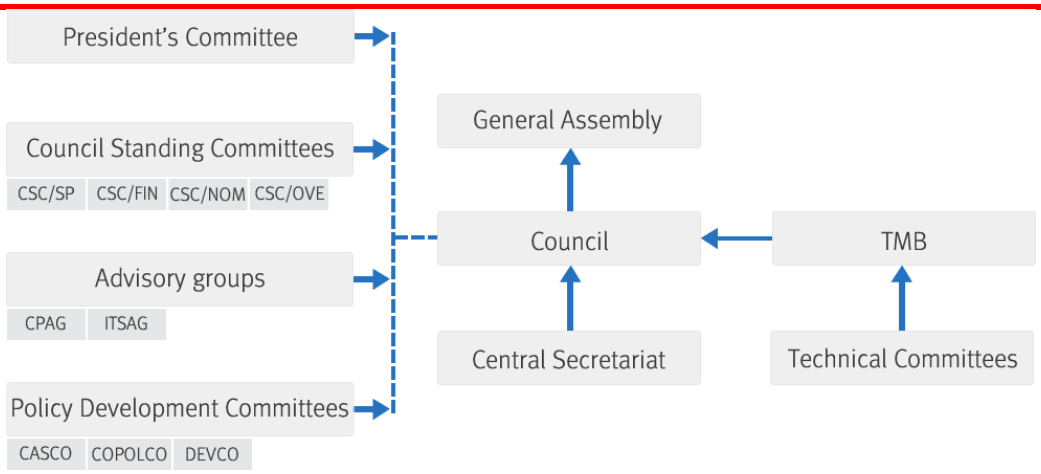


Fig 12: Structure of governance of ISO[1]

1.3: Categories of ISO Standards

ISO standards are diverse and cover a wide range of areas aimed at improving operational efficiency, safety and sustainability across industries. Below is a breakdown of the major categories of ISO standards.

1.3.1: Quality Management System (ISO 9000 Series)

The ISO 9000 series is among the most widely recognized standards in the world, focusing on quality management systems (QMS). It was released in March 1987. These standards help organizations ensure that their products and services meet customer and regulatory requirements consistently. It is made up of the following:

- ISO 9000:2015 - Quality Management Systems - Fundamentals and Vocabulary
- ISO 9001:2015 -Quality Management Systems -Requirements
- ISO 9004:2018 -Quality Management -Quality of an Organization - Guidance to Achieve Sustained Success
- ISO 19011:2018 -Guidelines for Auditing Management Systems

[1] "Structure of ISO." International Organization for Standardization (ISO), "https://www.iso.org/structure.html". Accessed 17 April 2025

1.3.2: Environmental Management (ISO 14000 Series)

The ISO 14000 series of standards focuses on environmental management, helping organizations reduce their environmental impact and improve their environmental performance. This series includes various guidelines, tools, and frameworks that organizations can use to establish, implement, and maintain effective environmental management systems (EMS)[1]. This series includes:

- ISO 14001:2015: Environmental Management Systems - Requirements with Guidance for Use
- ISO 14004:2016: General Guidelines on Implementation
- ISO 14006:2020: Guidelines for Incorporating Eco design
- ISO 14064 Series: Greenhouse Gases
- ISO 14046:2014: Water Footprint
- ISO 14040 & ISO 14044: Life Cycle Assessment (LCA)
- ISO 14040:2006: Principles and framework for life cycle assessment.
- ISO 14044:2006: Requirements and guidelines for conducting an LCA.
- ISO 14015:2001: Environmental Assessment of Sites and Organizations (EASO)
- ISO 14031:2013: Environmental Performance Evaluation
- ISO 14063:2006:Environmental Communication

1.3.3: Information Security Management (ISO/IEC 27000 Series)

In the digital age, information security is paramount, and the ISO/IEC 27000 family of standards is designed to help organizations secure their information assets whether digital, physical, or human-based. It supports the implementation, maintenance, and continual improvement of an Information Security Management System (ISMS). The series provides a risk-based approach to securing sensitive data, ensuring confidentiality, integrity and availability (CIA), the core principles of information security[2]. It includes;

[1] International Organization for Standardization, Environmental management systems, "Requirements with guidance for use", 1st edition, 2015, Geneva, pg. 1–35.
[2] International Organization for Standardization & International Electrotechnical Commission, Information technology," Security techniques, Information security management systems, Overview and vocabulary", 3rd edition, 2018, Geneva, pg. 1–30.

- ISO/IEC 27000 – Overview and Vocabulary
- ISO/IEC 27001 – Information Security Management Systems – Requirements
- ISO/IEC 27002 – Code of Practice for Information Security Controls
- ISO/IEC 27003 – Guidance for ISMS Implementation
- ISO/IEC 27004 – Monitoring, Measurement, Analysis, and Evaluation
- ISO/IEC 27005 – Information Security Risk Management
- ISO/IEC 27006 – Requirements for Bodies Providing Audit and Certification
- ISO/IEC 27007 – Guidelines for Auditing ISMS
- ISO/IEC 27008 – Guidelines for Assessors of Security Controls
- ISO/IEC 27009 – Sector-specific Application of ISO/IEC 27001 (among others)

1.3.4: Occupational Health and Safety Management (ISO 45001 Series)

ISO 45001 is an international standard developed by the ISO that provides a framework for managing occupational health and safety (OHS) risks. The goal is to prevent work-related injury and ill health and to create safer, healthier workplaces. It is applicable to all organizations regardless of size, industry or nature of work and is intended to be integrated into an organization's overall management system[1]. This includes:

- ISO 45001:2018 – Occupational Health and Safety Management Systems – Requirements
- ISO 45002:2023 – Guidelines for Implementing ISO 45001
- ISO 45003:2021 – Psychological Health and Safety at Work
- ISO/IEC TS 17021-10:2018 – Competence Requirements for Auditing ISO 45001
- ISO 45004 – Occupational Health and Safety Performance Evaluation (under development)
- ISO 45005:2020 – General Guidelines for Safe Working during the COVID-19 Pandemic
- ISO 45006 – (Proposed/Future) Business Continuity and OHS Risk Integration
- ISO 45007 – (Planned) Guidance for Small Organizations on ISO 45001 Implementation

[1] International Organization for Standardization, "Occupational health and safety management systems — Requirements with guidance for use", 1st edition, 2018, Geneva, pg. 1–45.

1.3.5: Food Safety Management (ISO 22000 Series)

ISO 22000 is an international standard developed by the ISO. It sets out the requirements for a Food Safety Management System, integrating widely accepted food safety principles like Hazard Analysis and Critical Control Points (HACCP) and applying them across the entire food supply chain. It is applicable to all organizations involved in food production, processing, transportation, storage, packaging, distribution, and even catering and retail[1]. It includes:

- ISO 22000:2018 – Food Safety Management Systems – Requirements for Any Organization in the Food Chain
- ISO/TS 22002-1:2009 – Prerequisite Programs on Food Safety – Food Manufacturing
- ISO/TS 22002-2:2013 – Prerequisite Programs – Catering
- ISO/TS 22002-3:2011 – Prerequisite Programs – Farming
- ISO/TS 22002-4:2013 – Prerequisite Programs – Food Packaging Manufacturing
- ISO/TS 22002-5:2019 – Prerequisite Programs – Transport and Storage
- ISO/TS 22003-1:2022 – Requirements for Bodies Providing Audit and Certification of FSMS
- ISO/TS 22003-2:2022 – Requirements for Certification of Food Safety Systems Based on HACCP
- ISO 22004:2014 – Guidance on the Application of ISO 22000
- ISO 22005:2007 – Traceability in the Feed and Food Chain – General Principles and Basic Requirements

1.3.6: Energy Management (ISO 50001 Series)

ISO 50001 is an international standard developed by the ISO that provides a framework for establishing, implementing, maintaining, and improving an Energy Management System. It is aimed at enabling organizations to follow a systematic approach in achieving continuous improvement of energy performance including energy efficiency, energy use, and consumption[2]. This series includes:

[1] International Organization for Standardization, "Food safety management systems — Requirements for any organization in the food chain", 2nd edition, 2018, Geneva, pg. 1–46.
[2] International Organization for Standardization, "Energy management systems — Requirements with guidance for use", 2nd edition, 2018, Geneva, pg. 1–42.

- ISO 50001:2018 – Energy Management Systems – Requirements with Guidance for Use
- ISO 50002:2014 – Energy Audits – Requirements with Guidance for Use
- ISO 50003:2021 – Requirements for Bodies Providing Audit and Certification of Energy Management Systems
- ISO 50004:2020 – Guidance for the Implementation, Maintenance, and Improvement of an EnMS
- ISO 50006:2014 – Measuring Energy Performance Using Energy Baselines and Energy Performance Indicators
- ISO 50015:2014 – Measurement and Verification of Energy Performance
- ISO 50047:2016 – Determination of Energy Savings in Organizations
- ISO 50049:2011 – Quantification and Reporting of Energy Savings Related to Organizations
- ISO 50010 (under development) – Guidance for the Energy Management System Integration with Other Management Systems

1.3.7: Social Responsibility and Sustainability (ISO 26000 Series)

ISO 26000 is an international standard developed by the ISO to provide guidance (not requirements) on social responsibility. It helps organizations act ethically and transparently in ways that contribute to the health and welfare of society, the environment, and stakeholders. It serves as a voluntary framework for organizations of all types and sizes[1]. This series includes:

- ISO 26000:2010 – Guidance on Social Responsibility
- ISO/TR 26000:2014 – Guidance on the Use of ISO 26000 (Technical Report)
- IWA 26:2017 – Using ISO 26000 Guidance on Social Responsibility in Management Systems

The International Organization for Standardization (ISO) has played a pivotal role in shaping the global framework for quality, safety, efficiency, and sustainability across industries. Since its establishment in 1947, ISO has evolved from a post-war initiative focused on industrial coordination to a comprehensive international body influencing nearly every sector of modern

[1] International Organization for Standardization, "Guidance on social responsibility", 1st edition, 2010, Geneva, pg. 1–106.

economic and technological life. Through its inclusive structure and consensus-driven processes, ISO ensures that its standards are globally relevant and widely accepted.

The diverse categories of ISO standards reflect the organization's adaptability to emerging global challenges and industry needs. Key standards have become foundational tools for organizations aiming to enhance performance, ensure compliance and build stakeholder trust.

Section 2: The development of the ISO Standards

The development of ISO standards is a highly structured and methodical process, designed to uphold the principles of transparency, inclusivity, and technical rigor. This process not only ensures that standards reflect the latest technological advancements and best practices, but also that they are shaped by the collective expertise and agreement of stakeholders from around the world. These stakeholders include industry experts, national standards bodies, government representatives, consumer groups, and non-governmental organizations.

By following a defined series of stages, ISO ensures that every standard is thoroughly vetted and broadly supported. Central to this development process is the principle of consensus-building, which fosters cooperation and alignment among diverse interests. This approach not only enhances the legitimacy and acceptance of ISO standards but also ensures that they remain practical, applicable, and widely adopted across various sectors and regions.

This section delves into the structured development process of ISO standards, exploring each stage in detail, highlighting the key participants involved, and emphasizing the crucial role that consensus-building plays in producing globally relevant and effective standards.

2.1: Stages of ISO Standard Development

The creation of ISO standards is guided by a systematic and inclusive process that emphasizes broad participation and consensus among stakeholders. This process is primarily carried out by ISO Technical Committees (TCs) and where necessary, their Subcommittees (SCs). Their collaborative work ensures that each standard is not only technically sound but also globally relevant. To maintain a high level of transparency, structure, and consistency, ISO follows a six-stage development process before publication. Throughout these processes, the emphasis on

collaboration and consensus ensures that all relevant perspectives are considered and that the resulting standards are widely accepted and practically applicable. These stages include;

2.1.1: Proposal Stage

The development of an ISO standard begins with the proposal stage, a crucial initial phase where the need for a new standard or the revision of an existing one is formally recognized and documented. This stage ensures that only relevant and necessary standards proceed through the ISO development pipeline, maintaining efficiency and relevance across industries[1]. This stage is further divided into different phases which include;

A) Identification of Need

The proposal stage typically begins when a gap or an emerging requirement is identified by stakeholders such as industry groups, government agencies, consumer associations, or researchers. These needs may arise due to technological innovation, regulatory changes, market trends, or global challenges that call for uniform practices or terminology. Once the need is established, it is translated into a formal submission known as a New Work Item Proposal (NWIP) which is the next phase.

B) Submission of a New Work Item Proposal (NWIP)

The NWIP is submitted using a standardized form (form 4) by a recognized entity within ISO's framework, A National Standards Body (NSB) (e.g. ANSI for the United States, BSI for the United Kingdom, Algerian Institute of Standardization for Algeria), an existing ISO Technical Committee or Subcommittee, The ISO Central Secretariat (in special circumstances) in liaison with ISO. The NWIP includes essential information such as:

- Title and scope of the proposed standard
- Justification for its development
- Relevance to stakeholders and industries
- Identification of the target users
- An assessment of existing related standards

[1] International Organization for Standardization, "ISO/IEC Directives, Part 1: Procedures for the technical work", 12th edition, 2022, Geneva, pg. 10.

- A project plan, including timelines and resources

C) Approval Process

Once the NWIP is submitted, it is circulated to the members of the relevant Technical Committee (TC) for voting and comment. For the proposal to advance, it must meet two key criteria:

- ✓ Majority support from participating members of the committee.
- ✓ At least five member bodies must express a commitment to actively participate in the development of the proposed standard by nominating technical experts.

This approval mechanism ensures that there is sufficient global interest and commitment before resources are invested in the development process.

If the NWIP receives the required support, the proposal moves to the next stage of development where a Working Group (WG) is established to draft the standard. If it fails to gain consensus, it may be revised and resubmitted or withdrawn entirely.

This initial stage is vital for maintaining the integrity and efficiency of ISO's standardization work by ensuring that only necessary and feasible standards proceed to development.

2.1.2: Preparatory Stage

This stage is where the actual drafting of the standard begins and it plays a crucial role in shaping the content and structure of the standard. The focus during this phase is on creating a Working Draft (WD) that will serve as the foundation for further committee-level discussion and review[1]. During the preparatory stage, the following phrase are followed.

A) Formation of the Working Group (WG)

In the Preparatory Stage, a Working Group is formed to develop the first version of the standard. The WG is typically composed of subject matter experts, technical specialists and stakeholders with deep knowledge of the industry or area of concern. These experts are selected from ISO's Technical Committees and Subcommittees or they may be invited from external organizations such as universities, research bodies or industry associations.

[1] International Organization for Standardization, "ISO/IEC Directives, Part 1: Procedures for the technical work", 12th edition, 2022, Geneva, pg. 13–15.

The composition of the WG is vital to ensure that the draft standard is well-rounded, drawing on diverse perspectives and expertise. The WG is usually led by a Project Leader, who coordinates the work of the group and ensures that deadlines and objectives are met.

B) Development of the Working Draft (WD)

The primary goal of the Preparatory Stage is the creation of a Working Draft, which is the first formal document containing the proposed content of the standard. The process of can be influenced by several factors like research and existing standards, stakeholder input and document drafting.

Several WDs (WD1, WD2, WD3, etc.) can be developed to represent successive versions of the standard being refined within the Working Group (WG). Each draft builds upon the previous one through expert review, feedback and revision. Here's what typically happens in each stage:

a) WD1 (Working Draft 1): First Conceptual Draft

The WD1 is an initial version created by the working group. It outlines the basic structure, objectives and tentative clauses of the proposed standard. At this stage, the focus is mainly on defining the scope, key terms and general framework. It is often incomplete or open-ended and is designed to prompt discussion and feedback. It is also shared within the working group for comments, suggestions and further development.

b) WD2 (Working Draft 2): Refinement

The WD2 incorporates feedback and suggestions gathered from WD1. It includes more technical detail and expands on the initial sections, often introducing specific requirements, processes or definitions. At this stage, the content starts aligning with existing ISO directives and standardized terminology. It remains internal to the working group and continues to be refined through expert discussion and review.

c) WD3 (Working Draft 3): Pre-Committee Draft Candidate

The third Working Draft (WD3) is a more mature and structured version of the standard, approaching readiness for broader review. It typically includes most of the major components such as the scope, clauses, annexes, and references. At this point, the working group focuses on finalizing the technical concepts and refining the language to ensure clarity and consistency.

If consensus is reached, WD3 may be promoted to the next stage as a Committee Draft (CD) that can be submitted to the Technical Committee for further evaluation and refinement. The draft should address key issues such as:

- Technical accuracy and feasibility
- Clarity and comprehensiveness
- Alignment with international best practices
- Relevance to industry and regulatory needs

There may be more than three working drafts such as WD4, WD5, or even further if the working group has not yet reached consensus on key aspects of the standard. This extended drafting process allows additional time to address complex technical issues, conflicting viewpoints or the need for greater clarity in certain sections. The number of working drafts required often depends on the complexity of the subject matter, the level of innovation involved and the diversity of stakeholder interests.

2.1.3: Committee Stage

The Committee Stage is a pivotal phase in the ISO standard development process where the Working Draft, developed during the Preparatory Stage, is subjected to a thorough review and refinement process by the full Technical Committee and/or Subcommittee responsible for the standard. This stage ensures that the draft is technically sound, aligns with international best practices and addresses the needs of all stakeholders[1]. The following phases are followed during this stage:

A) Review and Refinement by the TC and SC

Once the Working Draft is ready, it is presented to the relevant Technical Committee or Subcommittee for review. The TC or SC is typically composed of representatives from national standards bodies (NSBs) and other relevant stakeholders including industry experts, regulators, and consumer groups. These members are responsible for evaluating the draft from both a technical and practical perspective.

[1] International Organization for Standardization, "ISO/IEC Directives, Part 1: Procedures for the technical work", 12th edition, 2022, Geneva, pg. 15–17.

The key activities during this phase include:

- Initial Review: The full TC/SC examines the WD to assess its technical accuracy, clarity, and relevance.
- Incorporating Comments: During this phase, members of the TC and SC provide comments and suggestions for improvement.
- Debate and Consensus: The Committee Stage is often marked by detailed discussions and negotiations between members, especially when there are conflicting opinions or concerns. These debates are essential for building consensus, a core principle of the ISO development process.

B) Committee Draft (CD) and Iterative Refinement

As the draft is reviewed and revised based on input from the TC or SC, it evolves into a Committee Draft (CD). The CD represents a version of the standard that has been refined but is still subject to further revisions. The drafting process in this stage is often iterative, with the document undergoing multiple revisions to address comments, resolve technical concerns and ensure that the standard is as robust and comprehensive as possible.

There are several rounds of feedback during the Committee Stage and the draft may go through several versions before it is deemed ready to move forward. Each revision typically incorporates the following types of changes:

- Technical Adjustments: Modifications to technical content based on expert feedback or evolving industry practices.
- Clarifications and Refinements: Changes made to improve the clarity of definitions, terms, and concepts used in the draft.
- Scope and Alignment: Adjustments to ensure the standard addresses the full scope of issues while avoiding overlap with existing standards.

At the end of the Committee Stage, the draft should be in a relatively mature form, reflecting the collective input of the TC and/or SC. The document is typically ready to move on to the next stage where it will undergo a wider public review.

If significant technical issues or disagreements persist during this stage, the draft may be sent back for further revisions, or the proposal may be withdrawn if consensus cannot be reached. A voting process (optional) can be held where the draft is required receive majority votes from members to proceed. Also multiple drafts (CD1, CD2, CD3, etc.) maybe developed until a consensus is reached. This ensures that only high-quality standards move forward in the development process.

2.1.4: Enquiry Stage

This stage marks the transition of the standard from the technical committee level to a wider international audience, as the DIS is circulated for a formal vote and public comment. It is during this stage that the ISO standard undergoes its most extensive external review ensuring that it meets the global needs of all stakeholders[1]. The following phases are followed during this stage:

A) Transformation of the standard from Committee Draft to Draft International Standard

After the Committee Stage, where the document has undergone multiple iterations and refinements by the Technical Committee or Subcommittee, the draft is deemed ready for broader scrutiny. The Committee Draft evolves into a Draft International Standard, which is a more formal version of the document that represents a near-final proposal and is submitted to the ISO secretariat by the Committee Manger.

During this phase, the content of the document is typically stable but the primary goal is to verify that the proposed standard:

- Addresses the technical, economic and practical requirements of industries worldwide.
- Is free from any ambiguities or issues that could hinder global implementation.
- Reflects the consensus of the Technical Committee and takes into account any outstanding concerns.

The ISO has more than 174 national member bodies, representing countries across the globe who play a key role in gathering feedback from local stakeholders, including industries, regulators and other affected groups.

[1] International Organization for Standardization, "ISO/IEC Directives, Part 1: Procedures for the technical work", 12th edition, 2022, Geneva, pg. 17–18.

Each member body is tasked with:

- Distributing the DIS within their own country or region.
- Soliciting comments from industry experts, businesses, government agencies, consumer groups, and any other relevant stakeholders.
- Submitting feedback back to ISO through a structured comment system.

The purpose of this wide distribution is to ensure that the standard takes into account the practical needs, regulatory requirements and concerns of a broad international community.

B) Formal Voting, Public Comment Period and Feedback Evaluation

One of the main activities during the Enquiry Stage is the formal vote and the collection of public comments.

a) Formal Vote

Each ISO member body votes on whether they approve the DIS. The votes are categorized into:

- Positive vote/ vote of approval ($\frac{2}{3}$ *of the votes*): Means that the standard is generally supported by the member body.
- Negative vote/ vote of disapproval ($\frac{1}{3}$ $of\ the\ votes$): Indicates that significant changes or revisions are required before the standard can proceed.
- A vote of abstention: Occurs when a member chooses not to vote either in favor or against a DIS during ISO formal voting process.

If a positive vote is reached, the DIS may then to move to the next stage while if a negative vote is reached, the DIS may need to be revised or the project could be paused or terminated.

b) Public Comment Period

Along with the formal vote, there is a period for collecting public comments on the DIS. This is an essential part of the process to ensure transparency and inclusivity. Public comments allow individuals, organizations and other stakeholders (including those not directly involved in ISO's member bodies) to express their views on the draft. These comments might concern technical details, wording, scope or practical implementation issues.

c) Feedback Evaluation

The feedback from both the formal vote and public comment period is reviewed and considered by the Technical Committee. If the feedback raises significant concerns or issues, the TC may amend the DIS to address these points. The document may go through several revisions based on the feedback received, which may result in another round of voting and comment collection.

C) Revisions and Updates

Based on the formal votes and public comments, the DIS may undergo several rounds of revisions. If necessary, the draft is sent back to the Technical Committee for further refinement. Key revisions might include:

- Addressing technical objections raised by member bodies or external stakeholders.
- Clarifying ambiguous language or definitions that might lead to misunderstandings during implementation.
- Ensuring global applicability, particularly for industries that span multiple countries with varying regulations.

Once the necessary revisions are made, the revised DIS may be circulated again for another round of voting and comment but it is optional. After all concerns are addressed and there is sufficient consensus, the DIS is ready to move to the next stage.

At the conclusion of the Enquiry Stage, if the majority of votes are positive and the public comments have been addressed, the DIS is considered sufficiently mature and ready for the Approval Stage. If the feedback requires substantial changes or if the vote does not pass, the DIS may be returned to the Committee Stage for further revision, or the entire project may be reconsidered.

2.1.5: Approval Stage

This stage occurs after the Draft International Standard has undergone scrutiny and the necessary revisions. During this stage, the draft becomes the Final Draft International Standard (FDIS) and

undergoes the final approval process, marking its near-completion before official publication[1]. The FDIS goes is subjected to the following phases at this stage.

- Transition from DIS to FDIS

Once the Draft International Standard reaches the stage where it has been reviewed and feedback has been incorporated from the Enquiry Stage, the document may be revised and polished to form the Final Draft International Standard. This revision process is typically limited to addressing issues related to the clarity, presentation and structure of the document. The FDIS is essentially the final version of the document that will be voted on by ISO members. Key Features of FDIS include:

- Editorial Adjustments Only: At this stage, technical changes are not permitted. Any major revisions to the substance or scope of the standard are forbidden. This ensures that the standard's technical content has been sufficiently reviewed and agreed upon in previous stages. The FDIS represents a final draft with all technical disagreements resolved.
- Editorial Changes: While no technical modifications can be made, minor editorial changes are allowed. These include corrections to grammar, spelling, punctuation, formatting, and the overall layout of the document. Such changes ensure that the final text is clear, precise, and accessible for all readers.

- Final Yes/No Vote by ISO Members

Once the FDIS has been prepared, it is sent out for the final voting process. This is often the last formal step before the ISO standard is officially approved and published. The members have a period of two to cast their vote.

D) Voting Procedure

Members review the FDIS and cast a yes/no vote. The purpose of this vote is to confirm that there are no unresolved issues and that the standard is ready for publication.

[1] International Organization for Standardization, "ISO/IEC Directives, Part 1: Procedures for the technical work", 12th edition, 2022, Geneva, pg. 18–19.

- ✓ Approval Criteria: A two-thirds majority of voting members is required for the standard to pass. If one-quarter or more of the votes are negative (i.e., members do not approve the draft), the standard cannot proceed. In this case, further revisions may be necessary and the document may need to be reconsidered or returned for another round of revisions.
- ✓ Public Comments: Alongside the voting, NSBs may also provide comments on the FDIS, although the focus at this stage is on whether the text is suitable for publication rather than its technical content.

If the vote is successful, the document is officially adopted as an ISO standard and moves to the Publication Stage. If the vote fails, the document may be sent back for further revisions, reworking, or even abandonment of the project if it proves unfeasible.

C) Importance of the Approval Stage

The Approval Stage is designed to ensure that the standard meets the highest possible level of consensus and that all interested parties have had the opportunity to review and approve the final draft. The requirement for no further technical changes at this stage signals that the standard has been thoroughly vetted and is deemed technically sound by the relevant experts.

2.1.6: Publication Stage

The Publication Stage is the final step in the ISO standard development process. After the Final Draft International Standard has been approved by the members, a press release is held to explain the aim, objectives and significance of the standard. It is also made available to the public. This stage marks the completion of the standard's development process and the formal recognition of the standard as an official ISO document[1]. The following phrases are undergone at this stage

A) Transition from FDIS to Official ISO Standard

Once the FDIS has received approval through the final voting process (as described in the Approval Stage), the next step is to formally publish the document as an ISO standard. The Publication Stage involves the administrative process of preparing the document for wide distribution, including assigning it a unique ISO number. Key Features of this stage are:

[1] International Organization for Standardization, "ISO/IEC Directives, Part 1: Procedures for the technical work", 12th edition, 2022, Geneva, pg. 19–20.

- ISO Number Assignment: Upon approval, the document is assigned an official ISO number (e.g., ISO 9001:2015), which serves as a unique identifier for that particular standard. This number is used to reference the standard in all future communications, publications and legal frameworks.
- Official Publication: The final document, which is the ISO standard, is then made available to the public through ISO's official channels and press release. The publication signifies that the standard is fully recognized as an international benchmark and can be implemented by industries, governments, and organizations worldwide.
- Format: The published standard is typically available in both digital and print formats and it can be purchased from ISO's online store or through national standards bodies (NSBs). The content is usually made available for a fee, though some standards may be offered for free, especially when they are deemed vital for public safety or the environment.
- The launch of training and education program: This is a key part of the stage as it helps in the implementation and understanding of ISO standards across by stakeholders. These programs are developed to build capacity, improve compliance and ensure that organizations and individuals can apply standards correctly and efficiently.

B) Availability for Adoption and Use

After publication, the standard is officially available for adoption by the following stakeholders:

- National Standards Bodies (NSBs): Each country's NSB may adopt the ISO standard into its national standards system. This could involve translating the standard into the national language, adjusting it to meet local regulations, or creating a complementary framework for implementation.
- Industry and Sector Adoption: Industries that are affected by the standard may voluntarily adopt it to demonstrate compliance with internationally recognized best practices. Organizations may integrate the standard into their internal policies and processes, ensuring they align with global norms.
- Regulatory Bodies: Governments and regulatory bodies may choose to reference the standard in laws, regulations, or certifications. This often occurs in sectors such as manufacturing, environmental protection, healthcare, and quality management.

C) Maintenance and Updates

Once a standard is published, it doesn't necessarily remain static. ISO regularly reviews its standards to ensure they remain relevant, up-to-date and effective. Standards are subject to periodic reviews, typically every 5 years, to assess whether they need to be:

- Reaffirmed: The standard is still relevant and does not require changes.
- Revised: The standard is updated or modified to reflect new technology, practices, or international developments.
- Withdrawn: The standard is no longer needed or has been replaced by a new version.

These reviews are conducted by the relevant Technical Committees and Subcommittees and stakeholders may be invited to participate in the review process.

2.2: Certification Process

The certification process is a critical step in the implementation of ISO standards which signifies that an organization has successfully met the requirements of a specific ISO standard and is committed to continual improvement. It involves several structured phases, each designed to verify compliance, ensure the effectiveness of the management system and instill confidence among stakeholders. Certification is typically conducted by an accredited third-party certification body and provides a formal recognition that an organization operates in accordance with internationally recognized best practices[1].

A) Choosing of an appropriate standard

The first step in the certification process is selecting the ISO standard that suits the organization's objectives, operations and goals. For example, ISO 9001 is ideal for quality management, ISO 14001 focuses on environmental management and ISO 27001 is tailored for information security management.

[1] International Organization for Standardization, "ISO/IEC 17021-1:2015 — Conformity assessment — Requirements for bodies providing audit and certification of management systems", 1st edition, 2015, Geneva, pg. 1–38.

B) Choosing of a certification body

Once the standard is chosen, the organization must select a recognized, reputable and accredited certification body. It is this body that will hand out the certificate to the organization so credibility has to be taken seriously into account to ensure that the certificate can also be valid and credible.

C) Negotiation on the fees and charges of the certification

Certification bodies normally charge basing on various factors such as the size of the organization, the number of employees, the scope of the certification and if the organization operates in multiple locations. It is during these negotiations that organizations can discuss the different aspects like the duration of the audit, costs to be incurred, surveillance audit frequency and potential discounts in case of need for multi-standard certifications. This helps ensure the costs are fair and are within the organization's budget

D) Internal audits and pre-assessments

Before engaging a certification body, organizations typically conduct internal audits to evaluate if their objectives and goals are in line with the standard they want to apply for. This helps identify gaps, non-conformities and areas for improvement. Some organizations may decide to conduct a pre-assessment or mock audit using an external consultant or auditor to simulate the certification process. These preparatory steps allow organizations to address potential issues, prepare their documentation and ensure readiness for external audit.

E) The External audit process and stages (Stage 1 Audit and Stage 2 Audit)

The formal certification audit conducted by the chosen certification body occurs in two main stages:

a) Stage 1 Audit (Document review stage)

At this stage, the chosen certification body has to review all the necessary documents of the organization to ensure that they comply with the ISO standard being applied for, these documents may include quality management manuals (documents), standard operating processes, work instructors and records among others. Also the auditors may choose to do a preliminary visit to the site of the organization to familiarize themselves with the place and operations.

b) Stage 2 Audit (On-Site assessment stage)

This stage has to be conducted at the premises of the organization. The auditors have to evaluate the implementation and effectiveness of the management system policies used. The auditors can inquire the tools used to implement the systems, interview the employees and also just observe the processes in action. Then an auditor's report is written and sent to the certification body. The report includes the findings and the corrective actions.

F) Receiving of the ISO certificate (Certification)

After a successful audit, the organization is then awarded the ISO certificate to signify its compliance with the requirements of the selected ISO standard. The organization can officially use the ISO logo on its documents and can also mention its certification in meetings, press release and any other communication means. This certificate has a duration of three years before it is renewed.

G) Surveillance and re-certification audits

After receiving the certificate, the organization must undergo annual surveillance audit. This is to verify if the organization still complies with the requirement of the ISO standard it applied for. It is not as comprehensive as the audit conducted before certification. The re-certification audit happens at the end of the three years of the standard. During this audit, a comprehensive audit similar to that carried out before certification is done after which the standard is renewed for another three years.

2.3: Role of National Standards Bodies, Technical Committees, Stakeholder and Consensus-Building in the development of the ISO standards.

2.3.1: National Standards Bodies (NSBs)

These are bodies that represent their countries at the ISO. Each country is entitled to only one NSB which acts as its national authority for standardization. They perform the following roles;

- Representing of their countries at the ISO activities
- Translating, (if necessary) and adopting the standard into their national standards system.
- Promoting the use of the standard within their country.

- Providing training, certification, support and resources to help organizations implement the standard.
- Nominating experts to ISO TCs and WGs.
- Voting on different ISO drafts
- Proposing of New work items
- Role in national and international coordination

2.3.2: Technical Committees (TCs)

Technical Committees are important bodies within the ISO that are responsible for developing, reviewing and revising standards. There are various TCs within the ISO and each TC is responsible for a specific area of interest, task or sector to ensure that each standard is built based on expert knowledge. These are the roles of TCs;

- Drafting standards through conducting preliminary research and engaging of stakeholders to understand the challenges faced and also future expectations.
- Reviewing and revision of documents (CDs, DIS and FDIS) to address any concerns, clarify uncertainties and improve the overall quality of the drafts.
- Ensuring a consensus is reached so as a standard is widely accepted upon its publishment.
- Maintaining and updating the standards to ensure that they are up-to-date with the evolving needs of industries, regulators and consumers worldwide.

2.3.3: Stakeholders

A stakeholder is defined as any individual, group or organization with an interest in the content, application or impact of a given ISO standard. The stakeholders are practically the final consumers for the ISO standards so they play an important role in the development of a standard. Stakeholder input is can be gathered through national mirror committees, direct participation in TCs, WGs and public consultations on draft standards. Below are different categories of stakeholders and the roles they contribute:

- Companies, organizations and business: These stakeholders contribute practical knowledge basing daily operations, production processes, and logistics and supply chains. This that standards align with technological, economical and operational evolutions.

- Government and regulatory bodies: They play the role of ensuring that the standard aligns with legal frameworks, public policies, national and international regulations such safety, health, environmental protection. They also tend to adopt the standards as official regulatory tools and are referenced in legislation.
- Academic and research institutions: They play a role of offering scientific data and other models that can be used to enhance the technical quality standards. This encourages innovation and invention.
- Consumer and civil society groups: Since these groups operate in sectors where public trust is very important such as health, food, safety and environment conservation, they play a role of ensuring the key needs of the end-user related to those sectors are addressed.
- Trade associations and professional bodies: These associations and bodies tend to have many members affiliated to them so their opinion and expertise on market trends and other challenges give valuable feedback and basis for making the standards.
- Certification bodies and auditors: The certification bodies provide ISO certificates to organization that apply for them on behalf of the ISO. As for the auditors, they ensure that the organizations comply with the requirements of the standards.

2.3.4: Consensus/Consensus-building

Consensus is defined as an agreement of stakeholders without the sustaining opposition on substantial issues like updates on standards, creation of new standards among others. With this approach, the ISO shows its inclusiveness, respect and collaborations with all stakeholders through open discussions. Here are the roles of consensus-building:

- Discussion and deliberation especially among TCs, WGs and other committees where common ground and collaborative exchange is used to formulate standards.
- Iteration and revisions as the ISO tends to implement multiple review cycles on a standard before it is implemented.
- Voting procedures: this is because for a draft to transition into a standard, it has to undergo formal voting to proceed to the next stage. Therefore a consensus has to be reached during the voting procedures so as to progress to the next standard.

- Transparency and fairness since all stakeholders are accorded the same opportunities to participate in discussions, propose new changes and also in the voting process. This is done for all stakeholders regardless of their size and influence.

In conclusion, the development of ISO standards is a very broad and complex process that requires collaboration of different actors and entities. These actors and entities all have distinct but interconnected roles they play in the development process of a standard as discussed above. By carrying out these roles, the ISO is able to achieve its mission of developing standards which can support innovation, invention, safety, sustainability and global harmonization.

Section 3: Impact of application of ISO standards on Management.

In this section, we are going to discuss the various impacts of ISO standards in ensuring compliance and harmonization of standards of different organizations into a uniform standard that can be applied globally. These impacts are based on various factors for example governance of organizations, execution of the different management system policies among others since these standards are designed to support a variety of domains like health, safety, quality and environment among others.

- Standardization of different processes: This helps in the unification and standardization of the different processes which helps leaders and managers to implement them easily across different departments. This in the results into efficiency, reduction of mistakes and production of more reliable outputs.
- Improves risk management: Standards aid leaders to establish a well-structured risk management processes which are incorporated into the decision-making, organization governance and strategy development. This helps organizations address the risks to be minimized before they escalate.
- Improvement of decision-making: This is through the use of tools, audits and continuous improvement metrics to establish objectives and long-term goals from an evidence- based point of view.
- Encouragement of customer satisfaction: This is because customer satisfaction is a very essential requirement for ISO standards especially ISO-9001 which focuses on quality

management and continuous improvement to meet the satisfaction of customer needs. So all organizations that which to apply this standard have to ensure that all its operations result into customer satisfaction.

- Improvement of employee involvement and training: This is because employees have to be trained on the requirements of the standards applied in the organization. Also ISO standards emphasize competence, participation, involvement and communication of employees which makes employees feel involved in the application of a standard.
- Global recognition and access to international market: Organizations with ISO certificates receive international recognition as they demonstrate their commitment to quality, safety and continuous improvement. The certification also gives ISO certificate holders a more competitive edge over its competitors.
- Strengthening compliance and governance: This is through providing a structured framework which requires organization to meet legal and regulatory requirements. This helps activities in the organization to align with laws, regulations and ethical standards as in some cases the standards are incorporated into the laws of many organizations.
- Fostering a culture of continuous improvement: ISO standards require organizations to continuously enhance their systems, promote innovation and invention and also encourage adaptability. Standards like ISO 9001 encourage organizations to monitor, measure and analyze operations to identify areas for improvement.

With impacts, we discover the many impacts of ISO standards on management through providing well-structured frameworks which enhance operational efficiency, consistency, continuous improvement and accountability. As a result of these impacts, organizations can establish clear and standardized procedures across all departments to ensure consistency of their outputs.

Section 4: Challenges of application/implementation of ISO standards on management.

Since ISO standards have many positive impacts, they are bound to also have some challenges the organizations face during the implementation of the standards. These challenges can arise from various internal and external constraints. Below are some challenges:

- High implementation costs: The different costs of implementing the ISO can be high especially for small and medium sized enterprises (SMEs) who tend to have limited financial resources. These costs can include costs for hiring external auditors, fees for surveillance audits, and costs for training employees on how to implement the standards among others. These costs tend to hinder some organizations from implementing ISO standards.
- Integrating the standards with existing systems: This can be a challenge to organizations often resulting from inefficiencies and duplicated efforts. Also the some enterprise may be operating different systems which may not align with the frameworks of some standards they wish to implement.
- Insufficient training and awareness especially among employees: This undermines the effectiveness of implementing standards which results into poor executions and errors during audits. This is because the staff members may fail to follow the guidelines and requirements of the standards. Also without awareness, the standards may be viewed as a burden rather than a tool for improvement.
- Resistance to changes brought by the standards: This is a common challenge to the use of the standards as some employees especially the experienced tend to be hesitant to adopt the new procedures. This is because the new changes may be seen as increase for workloads and also increase in bureaucracy.
- Time-consuming audits and reviews: Internal and external audits require a lot of time prepare and collect the necessary documents necessary for all the audits to be successfully implemented. These audits activities sometimes require employees to step away temporarily from their duties so audit can be carried out thus disrupting the operations of the organizations.

- Lack of commitment especially from top management commitment: This happens when top management only views ISO certification as just an achievement without implementation of the requirements of the standard. This leads to delays in the improvements and also production of products that meet the customer needs.
- Complex amount of documents required: This is because a lot of documents have to be prepared before certification like the internal audit reports, policies and corrective action documents among others. This may result into errors during the preparations of these documents.

Solutions to the problems.

After identifying the problems, we ought to suggest or propose solutions to address the problems.

- Creation of supportive leadership and engaging of employees

When the leadership supports the ISO standards, it sends a clear message that the organization is taking a direction in continuous improvement and ensuring that resources are properly allocated. Also engaging the employees at all levels through training and involving them in decision-making creates a sense of ownership and responsibility. This also reduces resistance to change and increases accountability in the company.

- Adoption of simplified and efficient implementation strategy

This aims at customizing ISO systems to align with the company's objectives and processes. By adopting this strategy, companies can avoid unnecessary bureaucracy and ensure that all the procedures of the system support their operational needs. In the end, the approach enhances the system's efficiency and effectiveness to ensure that the system is easier to maintain over long periods of time.

- Simplification of the documentation and workflow design

Companies should aim to prepare clear and relevant documentation that is in line with operational requirements. Simplifying procedures into more user-friendly formats encourages employees to embrace the standards. This ultimately minimizes errors, ensures the system is easy to follow and implement, and prevents the issue of paper compliance.

- Carrying out regular audits and continuous improvement

Establishing a culture of regular internal audits that focus not only on external certification but also on identifying improvement opportunities. This ensures that issues addressed in audit processes are dealt with before becoming major problems during certification and also helps the company remain compliant and efficient with ISO standard requirements.

- Strengthening of government support and incentives

Governments should create financial incentives and tax breaks to support small and medium-sized enterprises (SMEs) in pursuing ISO certification. They should also provide more training and resources to help businesses navigate the certification process. This reduces the financial burden on companies and encourages broader adoption of ISO standards.

- Improving the accreditation and certification infrastructure

Governments, in collaboration with certification bodies, should work to expand the number of accredited certification organizations and simplify the certification process to reduce delays and improve accessibility. This would enhance the credibility and efficiency of certification, reduce reliance on foreign bodies, and lower the overall cost of certification.

Conclusion

In this section, we have tackled various aspects of ISO standards from their history, categories, development and impacts and challenges. The process of developing a standard is a complex and broad on however, the resulting standards not only improve organizational performance but also strengthen stakeholder confidence and open access to new markets.

However, the path to successful ISO implementation and certification is not without its challenges. Organizations. Despite these obstacles, organizations that invest in proper planning, staff training, and change management strategies can reap substantial long-term benefits including improved efficiency, customer satisfaction, and regulatory alignment. Moving forward, continued efforts to simplify standards, increase accessibility, and provide tailored support especially for resource-constrained organizations will be crucial to ensuring broader and more effective adoption of ISO standards in a swiftly changing global landscape. However, the path to successful ISO implementation and certification is not without its challenges. Organizations. Despite these obstacles, organizations that invest in proper planning, staff training, and change management strategies can reap substantial long-term benefits including improved efficiency, customer satisfaction, and regulatory alignment. Moving forward, continued efforts to simplify standards, increase accessibility, and provide tailored support especially for resource-constrained organizations will be crucial to ensuring broader and more effective adoption of ISO standards in a swiftly changing global landscape.

CHAPTER 3

AUDIT OF THE APPLICATION OF ISO STANDARDS ON THE MANAGEMENT OF ELECTRO-INDUSTRIES.

CHAPTER 3: AUDIT OF THE APPLICATION OF ISO STANDARDS ON THE MANAGEMENT OF ELECTRO-INDUSTRIES

Introduction

To truly understand the practical application of ISO standards in management, it is necessary to move past theory and conduct a real-world study. This chapter represents the practical continuation of the theoretical concepts discussed in the first two chapters, focusing on how ISO standards are applied and audited within an actual organization. For this purpose, we have chosen Electro-Industries AZAZGA, a certified company that implements ISO 9001:2015 (***see annex***) standard in its management practices. Through this case study, we shall study how theoretical frameworks are translated into daily operations within the company.

This chapter will analyze the processes the company followed to obtain the ISO certification, the efforts required to maintain it and how the principle of continuous improvement presents both a challenge and an opportunity. We will also examine the overall impact of ISO standards on the company's management system, performance and other relevant sectors.

By observing real-life practices and analyzing the findings, this case study will provide valuable insights into the effectiveness, challenges and benefits of applying ISO standards in a real-world management environment. It will also highlight key lessons learned and offer a detailed understanding of how structured standards contribute to organizational success.

Section 1: Presentation of Electro-Industries

Before diving into a detailed study of this case study and exploring how ISO 9001:2015 standard is applied within ELECTRO-Industries AZAZGA, it is important to begin with a closer look at the company itself. Getting to know the organization (its background, structure, and core activities) will help us to understand the environment in which these standards are put into use.

Knowing where the company comes from, what it does and how it operates on a daily basis provides valuable basis for our analysis. It allows us to see how ISO standards fit into the company's overall management approach and why certain choices were made during their implementation.

CHAPTER 3: AUDIT OF THE APPLICATION OF ISO STANDARDS ON THE MANAGEMENT OF ELECTRO-INDUSTRIES

1.1: Company Location

The company's headquarters are located on National Road No. 12 in Azazga, BP 17, 35 km east of the capital of the Wilaya of Tizi-Ouzou and 150 km from the capital, Algiers.

The company has two (02) production units and one technical services unit, all located on the same site in Azazga.

1.2: History of the company

Electro-Industries was created at the end of 1998 with the restructuring of the National Company of Electro-technical Industries (ENEL).

Electro-Industries is a public economic company (Société par Actions) whose share capital is 100% owned by the ELEC EL DJAZAIR Holding Company on behalf of the French State.

It consists of an integrated complex, built with German partners (SIEMENS), which has been producing and marketing motors, alternators and transformers since its inception in 1985.

Electro-Industries has a share capital of 4,753 million dinars and currently employs 840 people across the General Management, the two production units, and the technical services unit.

1.3: Domain of Operations/activities

Electro-Industries is the leading company in the field of electrical engineering, serving the capital goods market, namely:

- Primary Activity: Design, manufacture and marketing of electrical equipment (distribution transformers, asynchronous electric motors) and assembly of generator sets.
- Secondary Activity: Maintenance of equipment and infrastructure, subcontracting for third parties (metrology, physicochemical analysis, aluminum injection, machining, and heat treatment).

1.4: Presentation of the production units

The company has three (03) different types of units. These include;

1.4.1: Transformer unit: (T.R.U)

Production capacity: 4,000 transformers/year (the number depends on the power).

- Transformer power: 50 to 3,150 kVA (Range expansion)
- Typical MV voltages: 5.5 - 10 and 30 kV
- Typical LV voltage: 400 V

Material Resources (Equipment)

The Transformers Unit at Electro-Industries is fully equipped with advanced machinery and tools essential for the complete manufacturing and testing of finished transformer products. The unit's operations are characterized by a high degree of technological integration, matching the standards and capabilities of leading international companies operating in the transformer industry.

The manufacturing process incorporates a wide range of specialized technologies which includes;

- Boiler-making
- Mechanical Machining
- Surface Treatment
- LV/MV Winding and Electrical Insulation
- Magnetic Sheet Cutting
- LV and MV Electrical Testing

1.4.2: Electric motor unit: (E.M.U)

Annual production capacity for electric motor unit in Electro-Industries is;

- 20,000 motors from 0.25 to 400 kW at 1000, 1500 and 3000 rpm.
- 200 generator sets from 15 to 1250 kVA.

Equipment

The Electric Motor Unit is fully equipped with all the necessary advanced tools and machinery required for the complete production and quality assurance of electric motors. This includes precision winding machines, automated assembly lines, and high-efficiency insulation systems. Each motor undergoes rigorous electrical and mechanical testing to ensure compliance with

international performance and safety standards. The integration of these technologies allows the unit to deliver reliable and high-performance electric motors tailored to various industrial applications. The following technologies are used to manufacture the motors:

- Precision mechanical machining
- Magnetic sheet metal cutting
- Aluminum die casting
- Metal construction work
- Winding and insulation
- Surface treatment
- Electrical and mechanical testing

1.4.3: Technical Services Unit (T.S.U)

This unit is fully equipped with the skilled personnel and technical resources necessary to facilitate the wide range of essential support functions like;

- Equipment maintenance for the two (2) production units, E.M.U and T.R.U.
- Operation of all energy and fluid installations.
- Maintenance of the company's buildings and utilities.
- Design and production of tools, devices, molds, and various mechanical parts.
- Inspection of measuring and testing equipment.

In addition to its technical capabilities, the unit has a central laboratory dedicated to physicochemical testing of materials. This laboratory plays a very important role in ensuring that raw materials and components used in the production of transformers and electric motors meet strict quality and performance standards. It is equipped with modern analytical instruments capable of conducting various tests. Beyond serving internal needs, the lab also offers its testing services to external clients, maintaining Electro-Industries' position as a trusted and technically proficient industry partner.

The company's major projects (notable projects)

- Cutting tools for transformer and motor units

- Aluminum die-casting molds
- Cutting tools for external clients
- Production of aluminum alloy parts
- Verification of mechanical and electrical measuring devices
- Heat treatment
- Electrical discharge machining
- Precision machining

Electro-Industries has also done physicochemical testing for other companies like SONELGAZ, ENAD, etc.

1.5: The structure of Electro-Industries

The structure of Electro-Industries can be explained by the organogram below;

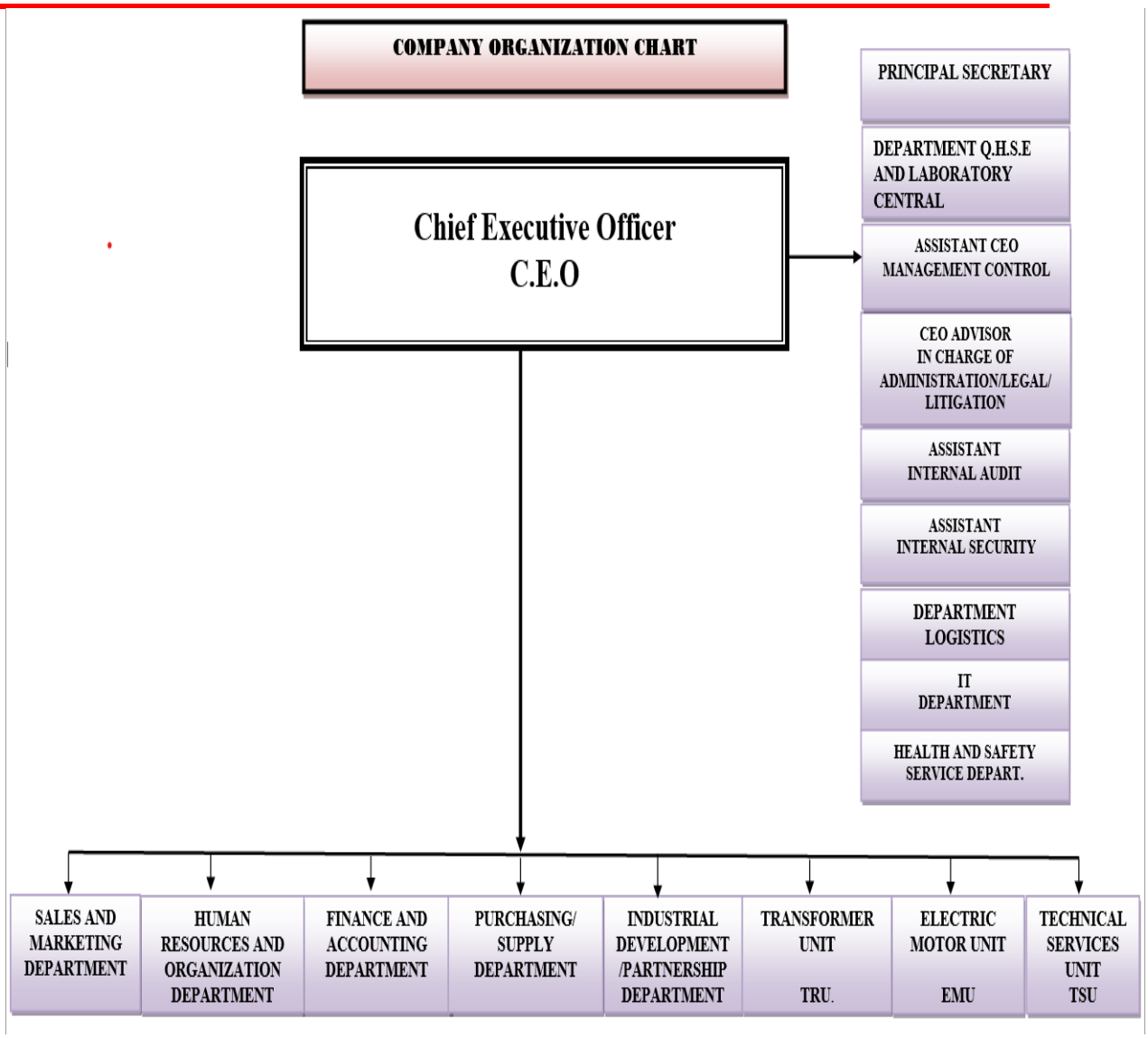


Fig No. 13: Organogram of the structure of the Electro-Industries[1]

1.6: Presentation of the structure of quality, hygiene, safety & environment (QHSE) department-central lab.

The department is headed by Mr. BELAID MALIK the Head of QHSE Department - Central Lab. He reports hierarchically to the Chief Executive Officer. (See organizational chart)

[1] Source: Internal company documents

1.6.1: Activities/ responsibilities of this department.

A) Management:

- Management and maintenance of the Quality Management System in accordance with ISO 9001.
- Implementation of an Integrated Management System (IMS) in accordance with ISO 9001 (Quality), ISO 45001 (Occupational Health and Safety), and ISO 14001 (Environment).
- Accreditation project for metrology and physicochemical analysis laboratories and electrical testing platforms in accordance with ISO 17025 which is currently underway.

B) Environmental Delegate:

- Responsible for all environmental matters:
- Regulations, awareness raising, regulated products, annual waste reporting, etc.

C) Central Laboratory:

- Ensure the proper functioning of the laboratory and oversee the inspections and testing of raw materials and materials (physicochemical tests) used in the manufacture of our products, in accordance with applicable regulations (standards).
- In addition, following the expansion of the Company's corporate purpose, external subcontracting activities will be carried out at the Central Laboratory (physicochemical analyses) which will include:
    - Transformer oil analysis
    - Physicochemical tests
    - Analysis of the chemical composition of materials and other tests

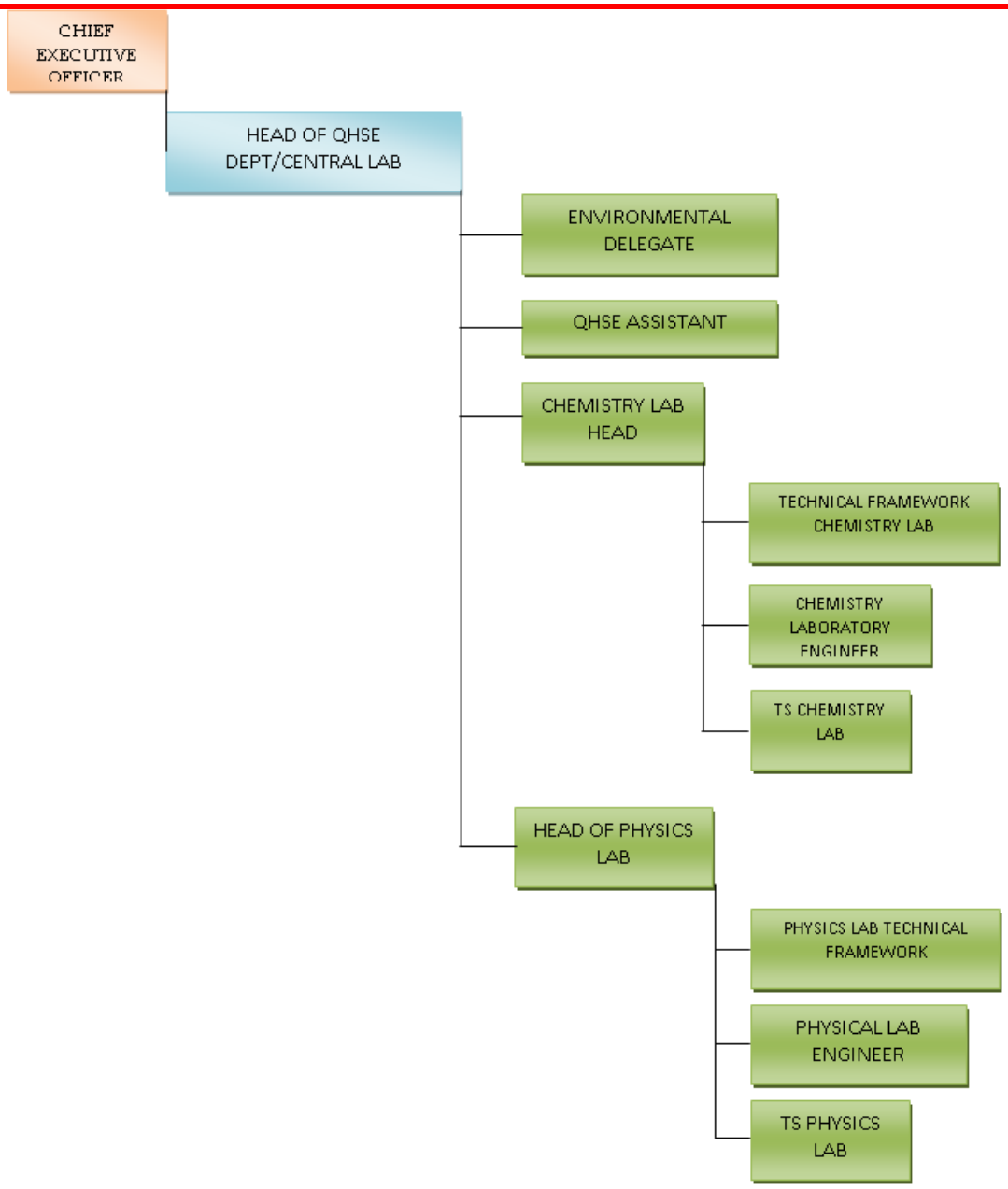


Fig No. 14: Organization chart structure of the QHSE department[1]

[1] Source: Internal company documents

1.6.2: The objectives of the department.

The department has several objectives which led to its creation.

- To ensure that the products of the company meet the customer needs and applicable standards
- To implement and maintain quality management systems within the company.
- To reduce defects, waste and process variations of products.
- To drive continuous improvement using various methods like internal and external audits, performance monitoring.
- To promote a strong safety culture, employee awareness and training of employees within the organization.
- To conduct risk assessment and implement control measures so as to prevent workplace accidents, injuries and illness.
- To ensure compliance with the local and international regulations according to ISO standards.
- To monitor and report on QHSE performance.
- To implement corrective and preventive actions.

1.6.3: Problems faced within the department.

The department faces some problems which include;

- Insufficient number of employees within the department.
- Limited resources and budget constraints.
- Employees not taking health and safety seriously and also neglecting the safety procedures.
- Many environmental challenges for-example climate change adaptations.
- Difficulty in maintaining the ever changing local and international regulations.

1.6.4: The forecast/future prospects of the department.

The department has set up goals they are working towards to attain.

- Increase the level of integration of digital tools and management software.
- Improvement of mental health and well-being within the company.

- Encouragement of continuous improvement and development of employee skills.
- Increase of the focus on the impacts of climate change.
- Attain ISO certification of different standards.

Section 2: Electro-industries quality policy

Electro-Industries is a company that focuses on designing, manufacturing and selling industrial electrical equipment, including oil-immersed distribution transformers, electric motors, and generator sets. It is ISO 9001 certified which reflects its commitment to maintaining high standards of quality. The company's main goal is to continuously improve its performance so as to meet and exceed its customers' expectations and needs. It also aims to deliver reliable, safe and high-quality products while also protecting the environment.

In order to effectively implement its quality policy, the company is committed to working towards:

- Optimization of its products, renewal of tools and upgrading of production equipment. This will lead to efficiency, reduce downtime and ensure our products meet the highest standards.
- Expansion of its product range through manufacturing medium-power MV/HV transformers (3.15 MVA - 20 MVA), manufacturing specific electric motors (ADF, with brakes, with gearbox) and re-launching the manufacturing of synchronous alternators.
- Encouraging partnerships for the transfer of technology and expertise. These partnerships help the company to benefit from new innovations, improve production methods and strengthen its capabilities.
- Expansion of the customer portfolio through finding new distributors of the company products. The aim is to introduce the company products to new markets and regions. This will help increase visibility and also attract more clients.
- Boosting commercial and marketing activities through the implementation of an economic monitoring policy. This allows the company to stay updated on market trends, customer needs, and competitor strategies so as to make better business decisions and create more targeted marketing campaigns.

- Reduction in the number of work accidents by strengthening its safety procedures and prevention measures. This includes regular employee training, risk assessments and strict compliance to health and safety standards. This helps create a safer work environment and improve overall productivity.

Electro-Industries' strategic priorities are backed by the company's strong commitments to achieve the following objectives:

- Satisfy its customers' needs.
- Meet the requirements of its stakeholders.
- Allocate the necessary resources for the smooth running of processes.
- Upgrade staff skills through training.
- Meet legal and regulatory requirements, as well as the requirements to which the company subscribes.
- Continuously monitor the effectiveness of its QMS and its performance.
- Improve working conditions to prevent personal injury and damage to health.

Section 3: Processes used to prepare for ISO certification by Electro-Industries.

Electro-Industries undertook well-structured processes in preparation for ISO certification ensuring that its operations met the required international quality standards. This preparation involved a series of well-defined processes (which will be discussed below) all aimed at developing an effective QMS. The goal was not only to achieve certification but also to improve efficiency, consistency and customer satisfaction across all operations of the company. These processes vary from one company to another, so the ones we are reviewing today are strictly utilized by Electro-Industries.

3.1: Management processes

These are processes or activities that guide, control and improve how a company operates. These processes are mainly strategic in nature and are used to ensure that the company's goals and objectives are effectively set, pursued and achieved. Electro-Industries chose the following management processes to help it in its goal of achieving ISO certification.

3.1.1: Strategic management processes

These are management processes through which management (leadership) sets strategic objectives, formulates action plans, monitors performance and also makes necessary changes to so as the company stays consistent with its goals and also be able to respond effectively and quickly to internal and external changes. These processes include;

- Setting long-term objectives for the company.
- Identifying the company resources.
- Implementing and monitoring progress and output through performance reviews.
- Making changes based on results, risks or new opportunities.

3.1.2: Continuous improvement process

This is the ongoing process of analyzing performance, identifying opportunities, and making gradual incremental changes to processes, products, services and personnel over time. By analyzing and improving processes, Electro-Industries is able save time and deliver an overall better product and services.

This process involves regular assessment daily company operations, identifying areas for that require improvement, implementing the improvements and reviewing their effectiveness to ensure long-term success.

3.2: Operational processes

These refer to the processes or activities that performed by a company to ensure that it stays competitive and maintains its position in the market. These are usually the day-to-day activities that facilitate the production of goods or services and are also instrumental in fulfilling the company's goals. Examples of operational processes used by Electro-Industries include;

3.2.1: Commercial processes or sales processes

These refers to all the structured processes or activities involved in promotion and selling within a company and also delivering of products or services to customers. These processes include:

- Analyzing the market.

- Maintaining customer relationships.
- Preparation of quotations or proposals for contracts.
- Negotiation and contract finalization.
- Order processing and delivery coordination.
- After-sales service and customer feedback collection.

3.2.2: Production process

The production process refers to the series of procedures, methods and operations used to transform raw materials into finished products. The production process at Electro-Industries is divided into two (02) which are,

- Designing and development of electric motors and assembly of generator sets. This involves engineering activities that define the motor's specifications and performance. The assembly of generator sets includes integrating engines, alternators and control systems which create complete and functional power generation units ready for testing and delivery.
- Designing and development of transformers. This involves creating detailed technical specifications, electrical schematics and mechanical designs that can meet performance, safety and regulatory requirements. This process also includes selecting appropriate materials, simulating performance, prototyping and validating the final design through testing before full-scale production.

3.3: Support processes

These are processes or activities that provide vital support through services and resources to enable the smooth functioning of a company's core processes. They do not directly add value to the final product or service produced within the company but they are critical for maintaining efficiency and quality across the company different sectors. Electro-Industries chose to apply the following five (05) processes.

3.3.1: Human resources management processes

These are strategic processes or methods that help a company to gain a competitive edge by optimizing employee productivity. These processes include hiring the right personnel, providing

training and development to the current employees, managing performance, handling promotions or transfers and ensuring a safe and respectful work environment. They also involve tasks like payroll and benefits management.

3.3.2: Equipment maintenance processes

The equipment maintenance process refers to the processes or activities carried out to ensure that all machines, tools and technical systems in a company are kept in good working condition. These include regular inspections, preventive maintenance, repairs, and replacement of parts to avoid breakdowns and extend the lifespan of the equipment. Proper maintenance helps prevent production delays, ensures safety and maintains the quality of products and services.

3.3.3: Purchasing processes

These are a series of procedures an organization has to follow in order to acquire goods, materials or services from external suppliers. These processes ensure that the company gets the best quality and quantity of items at the best value, on time, and in accordance regulatory requirements. These procedures mainly include identifying the needs, selecting and evaluating suitable suppliers, reviewing quotations, issuing purchase orders, receiving and inspecting deliveries, and managing payments.

3.3.4: Information technology (IT) processes

These refer to the well-structured processes or activities related to the planning, implementation, operation and support of a company's information systems and digital infrastructure. These processes ensure that technology resources such as hardware, software, networks and data are managed efficiently and securely.

These processes include managing user access, ensuring cyber security and data protection, maintaining hardware and software systems, backing up and recovering data.

3.3.5: Hygiene and environmental safety processes

These refer to the procedures and practices set up to ensure a clean, safe and healthy working environment while reducing the company’s negative impact on the natural environment. These processes are designed to protect employees from health hazards, prevent work place accidents,

manage waste responsibly, reduce pollution and ensure compliance with health, safety, and environmental regulations.

They include setting up work place sanitation and cleanliness routines, handling and disposal of hazardous materials, emergency preparedness and response plans and employee training on hygiene among others.

In conclusion, the successful preparation of Electro-Industries for ISO certification was made possible through the effective coordination of management, operational and support processes. Management processes provided strategic direction and oversight, operational processes ensured consistency in production of quality of products while support processes offered the necessary resources and infrastructure. All together, these processes created a strong foundation for meeting ISO standards and driving continuous improvement across the company.

Section 4: Requirements, process to gain and maintain the ISO certificate.

Achieving an ISO certificate is a very great achievement for any organization with many requirements and whose goal is to demonstrate commitment to quality, efficiency and continuous improvement. In this section, we shall talk about the actual experience of Electro- industries during it journey in obtaining ISO certification in a detailed way. Our aim is to clearly show what it takes to obtain the certificate and why it is also important.

As for the part of maintaining the certificate, it requires more than a one-time effort to carry out. It demands ongoing dedication to the standards and a culture of continuous improvement. Here, we will also examine how Electro-Industries adapted its operations to not only successfully complete regular audits but also to involve ISO principles into its daily practices.

4.1: Requirements fulfilled by Electro-Industries to obtain the ISO 9001 certificate.

The ISO standard has specific requirements for a QMS for an organization that needs to demonstrate its ability to consistently provide products and services that meet the applicable statutory and regulatory requirements and also aim to enhance customer satisfaction through the effective application of the system which includes processes for improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements. Below are the requirements.

4.1.1: Context of the company.

- Identification of internal and external issues affecting quality. Electro-Industries had to determine external and internal issues relevant to its purpose and its strategic direction which may affect its ability to achieve the intended result(s) of its QMS. It also has to continue to monitor and review information about these external and internal issues.
- Understanding the needs of customers and other stakeholders. This is because the company has to determine their type, nature and the requirements of its customers and other stakeholders relevant to its QMS. The company has to continue to monitor and review information about these parties.
- Definition of the scope of the QMS. When determining this scope, Electro-Industries had to consider whether the external and internal issues, the requirements of is customers and other stakeholders and the products and services of the company align with the

requirements of the ISO standard. This scope is available and updated so as to provide the required information to the interested parties.

- Establishment of the processes required for quality management. The company achieved this through determining the inputs required, the outputs expected, the resources needed, risks and opportunities of these processes

4.1.2: Leadership

Top management has to demonstrate leadership and commitment with respect to the QMS through;

- Taking accountability for the effectiveness of the QMS.
- Ensuring that the quality policy and objectives are established are compatible with the context and strategic direction of the organization.
- Promoting the use of the process approach and risk-based thinking.
- Ensuring that the resources needed to implement QMS are available.
- Communicating the importance of effective quality management.
- Ensuring that the QMS achieves its intended results.
- Focusing on enhancing customer satisfaction.

4.1.3: Planning

- Identification and addressing of risks and opportunities that may impact quality. The company has to consider the issues, the requirements, determine the risks and opportunities that need to be addressed and actions to address them in order to give assurance that the QMS can achieve its intended and achieve continuous improvement.
- Setting measurable quality objectives at relevant levels. These quality objectives should be consistent with the quality policy, measurable, monitored, communicated and be updated regularly. These objectives have to be well documented.
- Plan for changes in a structured manner to avoid disruption. This is through determining the purpose of the changes and their potential consequences, if the integrity of the QMS is affected, the availability of resources to fund the change and the allocation or reallocation of responsibilities and authorities.

4.1.4: Support

- Provision adequate resources, infrastructure, and environment. The company has to consider the capabilities of, constraints on existing internal resources, what needs to be obtained from external providers and ensure staff are competent and aware of their role in quality. It should also determine, provide and maintain the infrastructure necessary for the operation of its processes.
- Maintaining proper communication internally and externally. This acts as evidence of fitness for purpose of the monitoring and measurement resources.

4.1.5: Operation

The company has to plan and control all processes, manage the design and development for its products, control suppliers for raw-materials, ensure conformity during production and address nonconforming outputs to prevent defective products. This has to be done to understand and meet customer requirements.

4.1.6: Performance Evaluation

The company has to monitor and measure QMS performance using various methods like defined indicators TQM tools, conduct regular internal audits to check compliance and effectiveness and also review the QMS performance through management reviews.

4.1.7: Improvement

The company has to always take action to address nonconformities to prevent their recurrence, encourage continuous improvement in all departments and also utilize data and feedback to drive process enhancements.

4.2: The Electro-Industries journey (process) to obtaining and maintaining the ISO certificate (ISO 9001)

Electro-Industries successfully implemented a detailed Quality Management System (QMS) in accordance with the ISO 9001 standard, demonstrating its commitment to consistent quality and customer satisfaction. The company first achieved ISO 9001 certification in July 2004, marking an important milestone in its organizational development.

After achieving the certificate, Electro- Industries has continued to maintain its certification by renewing it every 3 years starting in 2007, 2010, 2013, 2019 and 2022. This has showed its dedication to continuous improvement and excellence of its operations. The certification covers the company's activities which include all designs, production and marketing activities for distribution of transformers, electric motors and generator sets.

During those three years, the company continues to do surveillance audit each year. The purpose of these audits is to monitor compliance, identify any issues that arise in implementation of the ISO, encourage continuous improvement. Electro-Industries has continued with these audits starting from 2005 till date.

In 2008, the company transitioned its QMS to align with the requirements of the updated ISO 9001:2008 standard following a successful completion of surveillance audit. This milestone showed that the company is committed to maintaining high standards of quality, risk management and customer satisfaction.

Later, the company demonstrated its ability to consistently meet the new standard's expectations, achieving the renewal of its ISO 9001:2015 certification after a successful surveillance audit done in November 2019. Continuing its dedication to continual improvement and operational excellence, Electro-Industries again renewed its certification in October 2022, following another thorough and successful recertification audit. These achievements highlight Electro-Industries' persistent investment in quality practices and its active stance to evolving industry requirements.

To this end, Electro-industries has committed to implementing an Integrated Management System (IMS) compliant with ISO 9001 (Quality), ISO 14001 (Environment) and ISO 45001 (Occupational Health and Safety) standards. This effort is part of a bigger strategy to improve

environmental conservation and protect the health and safety of its employees. This is to be implemented according to the following schedule;

- First step: Implementation of a Management System incorporating the ISO 45001 standard. (ISO 9001, ISO 45001). This standard is intended to focus on occupational health and safety of employees. Creation of a safe working environment will help prevent work place accident, injuries and health issues.
- Second step: Implementation of a Management System incorporating the ISO 14001 standard. (ISO 9001, ISO 45001 and ISO 14001). This is intended to build up from the first step set by the first step and show that the company is willing to commit to reducing the environmental impacts of its operations.

Accreditation

Electro Industries has also embarked on an accreditation process, according to ISO/IEC 17025-2017 Standard, for its electrical testing platforms and metrology and physicochemical analysis laboratories. With this accreditation, the company is continuing to demonstrate its stance on maintaining the highest standards of precision and quality in its testing and analytical services.

4.3: Approach adopted at Electro-Industries for the implementation of the QMS.

Electro-Industries developed a well-structured and strategic approach to implement its QMS in line with ISO standards requirements (ISO 9001:2000 which it has updated over the years to the latest ISO 9001:2015). The implementation approach focused mainly on aligning quality objectives with the company's goals and customer expectations. The processes were defined, monitored and improved continuously to ensure consistent quality and compliance.

4.3.1: Management commitment to launching of project for implementation of QMS.

Electro-Industries demonstrated a strong commitment to quality management, setting the foundation for continuous improvement within the enterprise by launching a dedicated project to establish its QMS in 2002, in accordance with the ISO 9001:2000 standard. To achieve this, the enterprise contacted a work support office in collaboration with the necessary authorities at the enterprise to conduct a thorough assessment of its existing processes, identifying gaps and areas for improvement. After, detailed diagnostic review was carried out to evaluate the company's capacity and the specific actions needed to meet the required standards. Based on this analysis, a comprehensive action plan was developed to address identified issues, improve operations and ensure a successful transition to an ISO-compliant QMS.

4.3.2: Development and implementation of actions, necessary documentation and employee awareness.

Several key actions were carried out to ensure that QMS is a success at Electro-Industries. These included conducting comprehensive training sessions for employees to familiarize them with the new processes and standards. The training provided employees with the knowledge and skills to adhere to the new standards effectively. In addition, documentation was created and structured which included essential procedures, forms and other necessary materials to guide employees in following the updated practices. This thorough documentation ensured consistency and understanding in the way tasks were to be executed.

Raising awareness among employees was another critical component of the QMS implementation. The company focused on educating the workforce about the importance of quality management and how their individual roles contributed to the overall success of the system. This was achieved through workshops, informational sessions and constant

communication. This helped Electro-Industries create an environment where every team member understood the importance of following the new procedures, contributing to the company's continuous improvement goals and also reduce resistance to the new changes among employees.

4.3.3: Implementation of QMS

After ensuring that the above approaches had been effectively executed, the next step was to implement the QMS. This implementation was a thorough and carefully planned process aimed at improving overall efficiency and ensuring high product quality. Over time, the system has become deeply embedded in the company culture, helping Electro-Industries meet its customer expectations, improve processes and maintain high standards across all operations.

4.3.4: Internal audit

In order to carry out internal audit at Electro-Industries, various procedures have to be followed. These criteria are as follows:

a) Development of the annual audit program.

Each year, an Annual Audit Program is developed by the Quality Management Manager (QMM) and afterwards submitted for approval by the Chief Executive Officer (CEO) (***refer to Annex No. 03***). This program outlines the planned internal audits for the upcoming year, specifying the areas to be audited, the audit objectives and the schedule. In formulating this program, the QMM must also conduct a thorough risk assessment, taking into account potential challenges that could impact the effectiveness or execution of the audits. These risks may include;

- Audit planning,
- Resources,
- Audit team composition,
- Audit implementation,
- Audit program monitoring, review, and improvement.

The audit program is established to cover all QMS processes and each process is audited at least once a year.

Below is an illustration of the annual audit program for Electro-Industries.

CHAPTER 3: AUDIT OF THE APPLICATION OF ISO STANDARDS ON THE MANAGEMENT OF ELECTRO-INDUSTRIES

ELECTRO - INDUSTRIES **15300 AZAZGA - ALGERIA**	**QHSE SYSTEM REGISTRATION** **ANNUAL AUDIT PROGRAM YEAR 2021**	**VISA C.E.O …….** **Edition :**

PROCESS	DOMAINES TO BE AUDITED	J	F	M	A	M	J	J	A	S	O	N	D
STRATEGIC MANAGEMENT	Understanding the organization and its context		X								X		
	Understanding the needs and expectations of workers and other stakeholders		X								X		
	Leadership and commitment		X								X		
	QHSE Policy		X								X		
	Planning		X								X		
	Actions to address risks and opportunities		X								X		
	Quality objectives and planning actions to achieve them		X								X		
	Resources		X								X		
CONTINUOUS IMPROVEMENT	Understanding the organization and its context		X								X		
	Understanding the needs and expectations of workers and other stakeholders		X								X		
	Determining the scope of the IMS		X								X		
	QMS		X								X		
	Planning		X								X		
	Actions to address risks and opportunities		X								X		
	Quality objectives and planning actions to achieve them		X								X		
	Monitoring, measuring, analyzing and evaluating performance		X								X		
	Improvement		X								X		

Source: Internal Electro-Industries document

The document above is an illustration of the audit program for Electro-Industries for the year 2021.

It starts with a header which contains the address and name of the company, the document title and purpose, the year when the audit will be carried out, the document edition and C.E.O's signature.

Below the header section is the part of the audit program that contains the different processes used in the company are on the program for auditing (strategic management and continuous improvement), the domains of to be audited which are grouped into different processes and the month when the audit will be carried out (for this case in February and October).

All this is done and sent to the relevant personnel to prepare the necessary documents and other requirements for the audit process.

b) Audit initiation & Auditor designation

The QMM is responsible for preparing and issuing the audit schedule and the designation of the audit team members (***refer to Annex No.04***). This schedule is formally communicated to the respective department leaders at least two weeks prior to or before the planned audit date allowing sufficient time for each department to make the necessary preparations. The schedule outlines the specific processes to be audited, the assigned auditors and the planned dates and times ensuring that all stakeholders are informed and in agreement.

c) Audit preparation

The designated team leaders and auditors prepare for the audit in various ways which include;

- Read or thoroughly review the specific chapters of the ISO standard (ISO 9001) relevant to the scope of the audit which is going to be carried out. They must also evaluate the company's internal management systems and documents such as policies, procedures and previous audit reports to ensure a clear understanding of the system that is implemented. This review helps auditors to prepare organized and effective audit tools including questionnaires and checklists that will guide their evaluation of compliance and performance during the audit.
- Preparing a detailed audit plan using the standardized form (***refer to Annex. No. 02***). This plan should outline the scope, objectives, schedule, areas to be audited, assigned auditors, and any relevant logistical considerations. Once completed, the audit plan must be submitted to the QMM for review and formal validation. Approval by the QMM ensures that the audit plan is consistent with the annual audit program and is in line with the company's objectives and ISO 9001 requirements.
- Distribution of the audit plan to the designated department managers whose departments are scheduled for auditing. This should take place at least one week before the audit date allowing sufficient time for managers and their teams to review the audit scope, understand the planned activities and gather any necessary documentation or records. It also facilitates better coordination, encourages transparency and ensures that the audited parties are well prepared to participate in the audit process.

- Preparing all the necessary forms that will be used throughout the audit process. Each form should be tailored to the specific objectives and scope of the audit to ensure consistency and accuracy in recording observations and findings. Proper preparation of these documents is essential to facilitate a well-structured and efficient audit to enable auditors to evaluate compliance with ISO 9001 requirements effectively. These forms may include;
    - Audit plan(***refer to Annex No.02***)
    - Observation sheet
    - Audit report

CHAPTER 3: AUDIT OF THE APPLICATION OF ISO STANDARDS ON THE MANAGEMENT OF ELECTRO-INDUSTRIES

An illustration of an Audit Plan

SERVICES and/or TEAMS	Key personnel to interview	Objectives of the Audit
SERVICES : - **Design/development of transformers** - **Production of transformers**		Internal audit of QMS according to: ISO 9001 V 2015

HOURS		AREAS TO AUDIT		KEY CONTACTS
From	**To**	**TITLES OF ISO CLAUSES**	**ISO**	
9h00	10h00	**Wednesday 25th May2022** **Process Design, Development, and Production Processor:** - Process Definition - Process Objectives and Performance - Risks and Opportunities		
10h00	11h30	**Design and Development Process for Transformers:** - Design and development steps. - Design and development review, verification and validation activities. - Internal and external resource requirements for design and development. - Responsibility, authority and interface control. - Documented information required to meet design and development requirements. - Design and development modifications.		
13h30	15h30	**Process for production of transformers:** - Planning of the production process. - Implementation of monitoring and measurement activities. - Appropriate resources to ensure compliance with product requirements. - Satisfactory execution of all planned actions. - Evidence of compliance with acceptance criteria. - Traceability until release authorization. - Non-conforming output items.		

Auditor Team leader	Signature	Auditor	Signature

Source: Internal Electro-Industries document

Above is an illustration of the audit plan containing various aspects as explained below.

The plan begins with overview section which is divided into the services or team, key personnel to interview and the objectives of the audit areas. In service or team area, is the different type of service that is in plan for auditing (Design/development of transformers, Production transformers in this case). The key personnel to interview area includes team leaders, process owners, design engineers, production supervisors and quality assurance representatives. The objectives of the audit areas has the main reasons as for why the audit is being conducted.

The next section is the audit schedule which has the time, areas to audit and key contacts areas. In the time area, has the time scheduled to conduct the audit (for example 9h00-10h00). The areas to audit includes the title of ISO standard and the clause (for example risks and opportunities, ISO 9001:2015 Clauses 4.4, 6.1, 8.1, 9.1). The key contacts areas has the personnel that are to be contacted during the audit process.

At the end of the plan, the team leader and the auditor have to sign their names and signature to confirm the findings and agreement on the outcomes of the sessions. This helps to ensure transparency and accountability for any issues raised or improvements suggested during the audit.

d) Audit Conduct/ Actual Audit

The opening meeting marks the official start of the audit mission. This is the initial meeting between the audited department and the auditor (all department managers/QMM/audit team leaders).

- It is an opportunity to confirm the agreement of all participants (the audited, the audit team) regarding the audit plan. The opening meeting provides a platform to ensure that all parties both the audited and the audit team are in agreement with the audit plan's scope schedule and objectives.
- To introduce the audit team and its members' roles. During the opening meeting, the audit team is formally introduced to the audited with each team member's role and responsibilities clearly explained. This ensures that the audited knows which auditors will be responsible for specific tasks such as interviewing key personnel, reviewing specific processes or documents and observing operations.
- To ensure that all planned activities can be carried out. The opening meeting provides an opportunity to confirm that the scheduled audit activities can be performed as planned within the designated timeframe. The audit teams and audited review all logistics such as access to the necessary departments, documentation and personnel.
- During the audit, the auditors verify the QMS's compliance with:
    - The company's own requirements for this system. Auditors assess whether the QMS is being implemented in accordance with the company's documented policies, procedures and internal standards.
    - The requirements of ISO 9001. Auditors also evaluate whether the QMS meets the requirements stated in the ISO 9001 standard, which provides internationally recognized guidelines for effective quality management.
- The audit team prepares the audit conclusions. At the end of the audit, the audit team consolidates all findings gathered during the evaluation for example evidence of conformity and any identified non-conformities. These conclusions summarize the overall performance of the QMS, highlight strengths and areas for improvement and create a basis of the final audit report that will be communicated during the closing meeting.

Closing meeting

During this meeting, the audit team presents the findings, conclusions and recommendations for improvement in the presence of the audited department managers, the QMM and the relevant personnel.

e) Observation sheet and Audit report

At the end of the audit, the audit team leader prepares the observation sheets (***refer to Annex No. 05***), which are distributed to the audited personnel after validation by the QMM. The audit team leader also prepares the audit report. (***refer to Annex No.06***).

CHAPTER 3: AUDIT OF THE APPLICATION OF ISO STANDARDS ON THE MANAGEMENT OF ELECTRO-INDUSTRIES

An illustration on an audit report

Audited processes	Audit findings	ISO 9001 V2015 Chapters
…….	**Positive points:**…… ……. **Areas for improvement**:…….. …….. **Areas that require attention:** …… …….. **Minor non-conformities:**…… …… **Major non-conformities:** ……..	
…….	**Positive points:**…… ……. **Areas for improvement**:…….. …….. **Areas that require attention:** …… …….. **Minor non-conformities:**…… …… **Major non-conformities:** ……..	

Auditor's name & signature

……

……

Source: internal Electro-Industries document

The audit report begins with a letter from audit team leader to the responsible parties describing what is in the report and then 3 sections (audited processes, audit findings and ISO standards clause or chapter).

In the audited processes section, we find the specific departments, functions or procedures that were reviewed during the audit process. The areas to be audited may include production, marketing, human resource, customer service among others. Each of the processes is aligned with the relevant ISO standard clause(s) to ensure compliance is being properly assessed.

In the audit findings section, it is broken down into positive points, areas for improvements, areas that require attention, minor and major non conformities. In the positive points section, the auditor highlights whatever the organization is doing well (good practices, process efficiencies, or successful implementations of ISO 9001:2015 requirements among others) so as to promote recognition and motivation for work well done. In the areas for improvement section, the auditor notes down observations that don't violate any requirements but also could be improved. The auditor may offer a few suggestions to increase performance and efficiency without classifying the area as a non-conformity. In the areas that require attention section, the auditor outlines the early warning signs or issues that, if not addressed immediately, could evolve and become non conformities. This is to encourage organizations pay attention to those areas that need closer monitoring and adjustment.

In the non-conformities section, the auditor writes all deviations from the standard being audited (ISO 9001:2015) requirements and can be recognized into minor and major non-conformities.

The minor non-conformities are the low risk deviations which do not significantly impact the organization system's effectiveness but still require correction.

The major non-conformities are serious breaches that could affect product quality, customer satisfaction or system compliance. They require immediate corrective action.

At the end of the auditor's report, the auditor has put his signature and name to signify that he agrees with whatever is in the report.

An illustration of the observation sheet

<table>
<tr><td colspan="2">O B S E R V A T I O N N° 01/01</td><td colspan="2">DATE……AUDIT No……ORDER No……..</td></tr>
<tr><td>A
U
D
I
T
O
R</td><td colspan="3"><u>OBSERVATION / DEVIATION / DRIFT:</u>

Auditors : Agreement of Audit:</td></tr>
<tr><td>A
U
D
I
T</td><td colspan="3"><u>Causes :</u>

<u>Correction:</u>

<u>CORRECTIVE ACTION PROPOSED:</u>

Planned Date: ……. Agreement of Audit: ……</td></tr>
<tr><td>RSMI</td><td colspan="2"><u>1st VERIFICATION /MONITORING OF THE IMPLEMANTATION:</u>
Verified on : New Planned date :
…….. ……</td><td>Closed on :

By:</td></tr>
<tr><td>1-DIR
2-RSMI</td><td colspan="2"><u>2nd VERIFICATION /CONCERNING EFFECTIVENESS:</u>
Verified on : New Planned date:
…….. ……</td><td>Closed on :

By :</td></tr>
</table>

Source: Internal Electro-Industries documents

In the above illustration, we can clearly see what transpires on an observation sheet during the audit process.

The sheet starts with the observation number, date, audit number and order number to help in tracking and record organization. The auditor (s) has to then describe his/her observation, deviation or drifts from the preset procedures that have been observed. This section provides the factual basis of what was found during the audit.

Following that, the audit team has to investigate and record the root cause of his/her observation, correction made (if any were taken immediately) and the proposed corrective action to prevent it from re-occurring. This section also includes a planned date for implementing the corrective action and also a space for the audit to agree on the proposed plan. This is to ensure proper accountability and that the proposed plan aligns with the quality objectives.

At the end of the form are two follow-up sections that help ensure implementation and effectiveness. The 1st verification is conducted by responsible parties (e.g. director, RSMI) to check and verify whether the corrective actions have been effectively applied by the planned date. The 2nd verification is to assess the effectiveness of those actions over time so as to ensure that the issue has not re-occurred. Each stage has to include the verification dates, responsible individuals and the final closure of the observation once everything is solved.

This whole process is to ensure the existence of continuous improvemt and compliance with quality management systems.

Responsible	Document output	Process flow-chart	Document output
QMM Chief Executive Officer (CEO) Audit Team		Development of the annual audit NO Validation by CEO YES Preparation and distribution of the audit schedule / Appointment of auditors	Annual audit program
QMM Audit Team	documentation	Documentation review/ Development of the audit plan NO Validation by QMM YES Distribution of Audit plan	Audit Schedule Questionnaires or check-list Audit Plan
Head of Department/QMM / Audit team Leaders Audit Team		Audit opening meeting AUDIT	
Head of Department/QMM / Audit team Leaders Audit Team QMM Head of Department		Preparation of audit conclusions Audit closing meeting Preparation of audit observation sheets and audit report NO Validation by QMM YES Transmission and Monitoring of Observation Sheets	audit observation sheets and audit report

Fig No.13: A flowchart describing the internal audit process.[1]

The flowchart above has 4 sections (responsible, document input, process flow chart and the document output). Below is a break down in what the flow chart represents.

The quality management manager (QMM) develops the annual audit program which is sent to the C.E.O for validation. If it's not validated, it is sent back to the QMM to make changes and adjustments and if it is validated then an audit schedule is prepared, distributed and the auditors to carry out the audit are appointed by the audit team.

The audit team has to review the necessary documents after which it develops an audit plan which they share with the QMM for validation. If the QMM doesn't approve the plan the audit team has to make adjustments and if the plan is approved, it is distributed to the relevant personnel like department heads, C.E.O among others.

The audit team leaders, the heads of the departments and the QMM have an audit open meeting to solve a few issues after which the actual audit is carried out by the audit team. The team concludes the audit process and their after an audit closing meeting is held by the audit team leaders, the heads of the departments and the QMM to discuss what transpired in the audit report.

After the meeting, the audit team prepares the observation sheet and the audit report from their findings during the audit process. This report is shared with the QMM who has to validate it. If it is not validated then the audit team has to make adjustments and relevant changes but if it is validated, then it is sent to the heads of the department for monitoring especially the observation sheet.

With this break drown, that's how an internal audit is carried out at the Electro-Industries.

[1] Source: Internal Electro-Industries document

4.3.5: Nonconformities and Corrective Actions

During the QMS implementation process at Electro-Industries, internal audits played a crucial role in identifying areas where processes did not conform to ISO 9001 requirements or internal procedures. These deviations, known as nonconformities, were documented and analyzed to determine their root causes.

To effectively address these issues, the company implemented a structured corrective action process, which included the following steps:

- Identification and Documentation: Each nonconformity was clearly recorded with supporting evidence, specifying the process or area affected and the nature of the deviation.
- Root Cause Analysis: A thorough investigation was conducted to determine the underlying causes of the nonconformity rather than treating only the symptoms.
- Development of Corrective Actions: Based on the analysis, appropriate corrective actions were defined to eliminate the root cause and prevent recurrence. These actions could involve process revisions, retraining of staff or improvements in documentation and controls.
- Implementation and Monitoring: Corrective actions were implemented and tracked to ensure they were carried out effectively. Responsible persons and timelines were assigned to each action item.
- Verification of Effectiveness: Follow-up evaluations and re-audits were conducted to confirm that the corrective actions resolved the nonconformities and that no further issues occurred in the same area.

4.3.4: Certification Audit (July 2004)/ External Audit

Following the successful internal validation of its QMS, Electro-Industries proceeded to the final and critical phase of its ISO 9001 implementation journey the certification audit, which was conducted in July 2004.

This audit was carried out by an independent, accredited certification body, whose role was to objectively assess whether the company's QMS conformed to the full set of ISO 9001 requirements.

After successfully passing this audit, the company was awarded the 1SO 9001 by Alicef SPA an accredited certification body in ALGERIA.

4.4: Contributions and benefits of ISO 9001 (quality management) to Electro-Industries.

- Good organization.

This helps the company to clearly define roles, responsibilities and processes, which leads to better coordination across departments. It also encourages proper documentation and structured workflows thus improving efficiency, minimizing errors and also easy training of new employees.

- A positive brand image.

As a result of being certified, it signals to customers, partners and stakeholders that the company is committed to quality, consistency and continuous improvement. This builds trust and credibility, making clients more likely to choose the company over its competitors.

- Certification requirements during calls for tenders for contracts.

This has significantly improved the company's chances of winning contracts because of fulfilling the formal quality assurance requirements as it demonstrates the company's ability to deliver reliable, consistent and quality products or services that can meet and satisfy the customer's needs or expectations.

- An advantage over competitors.

Where its competitors without certification may struggle to prove the reliability of their processes, Electro-Industries, an ISO-certified company that has well documented systems and with internationally recognized validation makes it a more attractive and better choice for clients, partners and investors.

4.5: Challenges and constraints encountered because of using ISO 9001 (QM) by Electro-Industries.

- Resistance to change by staff at the beginning of the QMS implementation.

Employees especially experienced employees tend to feel uncertain, overwhelmed or skeptical about new procedures and changes that come with it. This resistance can slow down progress and affect morale if not managed properly.

To solve this requires clear, the staff must be involved in the process and training to help them understand the benefits of the system.

Conclusion

Our main target in this chapter was to bridge the gap between the theoretical approaches/understanding and practical implementation of ISO standards, specifically ISO 9001: 2015 within Electro-Industries. Through close examination of the company's journey to certification, its on-going commitment to maintaining standards and the integration of continuous improvement into daily operations, we have been able to gain deeper and concrete understanding of the real-world influence of ISO standards on organizational management.

This case study demonstrates that whereas the implementation of these standards demands great and significant efforts and adaptability, it also fosters a culture of improved performance, enhanced organizational structure and an environment of quality and accountability. In the end, this practical analysis demonstrates that ISO standards are not only just theoretical frameworks but rather also powerful tools for achieving sustainable management excellence and long term success.

General Conclusion

At the end of our study research on the theme “Audit of the application of ISO standards in management”, we can to draw very many important conclusions which address our main question “What are the implications and challenges of implementing Total Quality Management (TQM) and integrating ISO standards into an organization's management system?”

After our analysis of the theoretical frameworks, management practices, daily operations and application of ISO standards, we came to discover the nature of this transformation. The most significant finding is that the implementation of TQM principles and ISO standards, ISO 9001 to be in particular, serves not only as a tool for compliance but also a strategic objective for continuous improvement, customer satisfaction and organizational efficiency.

In this thesis, we examined the fundamental principles of TQM such as customer focus, leadership, employee involvement, process approach and continuous improvement and how they align with the requirements of ISO standards. Our research showed that the successful integration/application of ISO standards into a management system can greatly enhance organizational performance. Despite the many benefits of integration of the standards, it also revealed a number of challenges organizations tend to face in the application process which include resistance to change, lack of staff training and poor documentation among others.

Our case study of Electro-Industries in Azazga, Tizi-Ouzou provided many valuable revelations of the real-world application of the ISO standards in management of an organization. It showed that whereas the implementation of these standards can increase consistent in operations and customer satisfaction, a strategic approach, adequate resources and a culture of continuous quality improvement at all operational levels is required.

This study research has enabled us, as students, to gain a deeper and broader understanding of the practical and theoretical implications of applying the international standards within an organization. It also clearly highlighted that the ISO certificate is not the end goal but a framework/basis for achieving long-term success, accountability and provide a response to the needs of the stakeholders.

As Algeria continues to evolve and grow its business sector, it is also important for organizations like Electro-Industries to not only comply with the ISO standards but also include them as a part of an integrated management strategy. This can be done by carrying regular audits, ongoing

training and also actively involving all employees in the aim of achieving quality and continuous improvement.

Just like any other study, also this research-study is not without limitations. Due to time constraints, few slots to do the research, limited organizations that apply ISO standards and limited access to confidential internal data, our research was restricted to a single case study and also we heavily utilized the publicly available information. This led to our findings not being global or applicable generally to all organizations.

For future research, please try to conduct comparative studies of multiple organizations, use quantitative performance metrics and also try exploring the long-term impacts of ISO integration on organizational performances and financial results. Also further research on the roles of digital tools in facilitating ISO compliance could be of great significance to organizations with the aim of undergoing digital transformation.

After our research and also basing on the findings, we have the following recommendations to offer to Electro-Industries so as to enhance its quality management systems.

- **Try to increase investment in the continuous training and awareness programs for all employees to educate them on the principles of TQM and ISO requirements.**
- **Try to develop a QMS of the company which can surpass ISO standards requirement to ensure the real continuous improvement.**
- **Establish a cross-functional quality management team which can monitor ISO implementation, identify areas requiring improvement and ensure that they align with the strategic goals.**
- **Adopt quality management software to streamline documentation and also process automation to facilitate easy traceability, accountability and improve internal audits.**
- **Carry out external audits and consultations regularly to assess the systems and also give the best recommendations.**

In conclusion, we hope this study provides great contributions to a broader and clearer understanding of the strategic importance and value of ISO standards and TQM practices and also that it helps in future-decision on how organizations in Algeria can better carryout quality management in a global and increasingly competitive market landscape.

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Abstract:

The implementation of ISO standards has become fundamental for improving and promoting efficiency, quality assurance and cultivating continuous improvement. This thesis explores the audit process used in assessing the effectiveness and compliance of ISO standards in management with a focus mainly based on ISO 9001 which is about Quality Management. The research study highlights the different ways audit contributes not only as a tool for verification but also as a mechanism for improving performance, identification of risks and elevating stakeholder trust. By using a combination of theoretical analysis/research and case studies (practical research) the study examines the roles of auditors, audit methodologies and the results from audit processes. The findings of the study suggest that carrying out well-structured and regular audits can contribute to the integrity and continuous improvement of management systems there by reinforcing a culture of accountability and strategic alignment.

Keywords:

ISO standards, Total Quality Management, management systems, audit, continuous improvement.

Résumé

La mise en œuvre des normes ISO est devenue fondamentale pour améliorer et promouvoir l'efficacité, l'assurance qualité et favoriser l'amélioration continue. Cette thèse explore le processus d'audit utilisé pour évaluer l'efficacité et la conformité aux normes ISO en management, en s'appuyant principalement sur la norme ISO 9001 relative au management de la qualité. L'étude met en évidence les différentes façons dont l'audit contribue, non seulement comme outil de vérification, mais aussi comme mécanisme d'amélioration de la performance, d'identification des risques et de renforcement de la confiance des parties prenantes. En combinant analyse/recherche théorique et études de cas (recherche pratique), l'étude examine le rôle des auditeurs, les méthodologies d'audit et les résultats des processus d'audit. Les conclusions de l'étude suggèrent que la réalisation d'audits bien structurés et réguliers peut contribuer à l'intégrité et à l'amélioration continue des systèmes de management, renforçant ainsi une culture de responsabilisation et d'alignement stratégique.

Mots-clés:

Normes ISO, Management de la Qualité Totale, systèmes de management, audit, amélioration continue.

APPENDICES

CERTIFICAT

NORME ISO 9001 : 2015
Système de Management de la Qualité

ALICEF SPA,
Alger – Algérie

Il est certifié que **ELECTRO-INDUSTRIES**

Sis à ***Route Nationale N° 12 Azazga – Tizi Ouzou - Algérie***

Site(s) concerné(s) ***Direction Générale et unités de production (Organisme mono-site)***

A établi et tient à jour un système qualité conforme aux exigences de la norme EN ISO 9001 : 2015 "Systèmes de Management de la Qualité" pour :

Conception, fabrication et commercialisation de matériels électriques (transformateurs de distribution, moteurs et groupes électrogène)

Le présent certificat est basé sur le résultat d'un audit qualité, documenté dans le rapport d'audit **RA22091-24A** réalisé du **23 au 27 octobre 2022**

Numéro du certificat : **13 026-24A**
Date de délivrance initiale le : **5 août 2013**
Date d'expiration du dernier cycle le : **7 août 2022**
Date de délivrance le: **21 novembre 2022**
Ce certificat expire le: **7 août 2025**

Les informations complémentaires concernant le périmètre de ce certificat et l'application des exigences de EN ISO 9001 : 2015 peuvent être obtenues auprès du titulaire de ce certificat.

Le présent certificat est octroyé moyennant respect du Règlement Général de ALICEF Spa

Au nom de l'organisme de certification

ALICEF
INDUSTRIE - CERTIFICATION - ENVIRONNEMENT - FORMATION

Muriel BARRA
Présidente de la Commission de Certification

ALGERAC
Organisme Algérien d'Accréditation
Certification Systèmes 3-001

Annex No. 01: ISO 9001 Certificate

Source: Internal Electro-Industries document

ELECTRO INDUSTRIES **15300 AZAZGA - ALGERIE**	ENREGISTREMENT QUALITE **PLAN POUR l'AUDIT** N° 001 / 2022	VISA RSMI…… DATE : 22/05/2022 PAGE : 1 / 1

SERVICES et/ou EQUIPES	Principaux Responsables à interviewer	Objectifs de l'Audit
SERVICES : **- Conception/développements transformateurs** **- Production transformateurs**		Audit interne du SMQ selon: ISO 9001 V 2015

Heures		Domaines à auditer		Principaux interlocuteurs
de	à	Intitulés des thèmes (Chapitres ISO)	§ ISO	
9h00	10h00	**Mercredi 25 Mai 2022** **Processus Conception, développement et production Transformateur :** - Détermination du processus. - Objective et performance du processus - Risques et opportunités		
10h00	11h30	**Processus Conception et développement Transformateur :** - Etapes pour la conception et développement. - Activités de revue, vérification et validation de la conception et développement. - Besoins en ressources internes et externes pour la conception et développement. - Responsabilité et autorités et maitrise des interfaces. -les informations documentées nécessaires pour satisfaction des exigences de la conception et du développement. - Modification de la conception et développement.		
13h30	15h30	**Processus Production Transformateur :** - Planification du processus de production. - Mise en œuvre des activités de surveillance et de mesure. - Ressources appropriées pour obtenir la conformité aux exigences relatives au produit. - Exécution satisfaisante de toutes les dispositions planifiées. - Preuve de conformité aux critères d'acceptation. - Traçabilité jusqu'à autorisation de libération. - Eléments de sorties non conforme.		

Auditeur Chef d'équipe	Visa	Auditeur	Visa

Annex No. 02 : AUDIT PLAN

Source: Internal Electro-Industries document

Appendices

ELECTRO - INDUSTRIES 15300 AZAZGA - ALGERIE	ENREGISTREMENT SYSTEME QHSE PROGRAMME ANNUEL D'AUDITS ANNEE 2021	VISA P.D.G …… Edition :

PROCESSUS	DOMAINES A AUDITER	J	F	M	A	M	J	J	A	S	O	N	D
PILOTAGE STRATEGIQUE	Compréhension de l'organisme et de son contexte		X								X		
	Compréhension des besoins et attentes des travailleurs et autres parties intéressées		X								X		
	Leadership et engagement		X								X		
	Politique QHSE		X								X		
	Rôles, responsabilités et autorités au sein de l'organisme		X								X		
	planification		X								X		
	Actions à mettre face aux risques et opportunités		X								X		
	Objectifs qualité et planification des actions pour les atteindre		X								X		
	Ressources		X								X		
AMELIORATION CONTINUE	Compréhension de l'organisme et de son contexte		X								X		
	Compréhension des besoins et attentes des travailleurs et autres parties intéressées		X								X		
	Détermination du domaine d'application du SMI.		X								X		
	SMQ		X								X		
	Planification		X								X		
	Actions à mettre face aux risques et opportunités		X								X		
	Objectifs qualité et planification des actions pour les atteindre		X								X		
	Surveillance, mesure, analyse et évaluation des performances		X								X		
	Amélioration		X								X		

	SMQ		X								X		
RESSOURCES HUMAINES	Politique QHSE		X								X		
	Planification		X								X		
	Actions à mettre face aux risques et opportunités		X								X		
	Identification des dangers et évaluation des risques et opportunités		X								X		
	Objectifs qualité et planification des actions pour les atteindre		X								X		
	Compétences		X								X		
	Sensibilisation/ prise de conscience		X								X		
	Surveillance, mesure, analyse et évaluation des performances		X								X		
	Amélioration		X								X		
MAINTENANCE	SMQ		X								X		
	Actions à mettre face aux risques et opportunités		X								X		
	Identification des dangers et évaluation des risques et opportunités		X								X		
	Objectifs qualité et planification des actions pour les atteindre		X								X		
	Surveillance, mesure, analyse et évaluation des performances		X								X		
COMMERCIAL	SMQ		X								X		
	Actions à mettre face aux risques et opportunités		X								X		
	Identification des dangers et évaluation des risques et opportunités		X								X		
	Objectifs qualité et planification des actions pour les atteindre		X								X		
	Exigences relatives aux produits et services		X								X		
	Communication avec les clients		X								X		
	Détermination des exigences relatives aux produits et services		X								X		
	Revue des exigences relatives aux produits et services		X								X		
	Modifications des exigences relatives aux produits et services		X								X		
	Surveillance, mesure, analyse et évaluation des performances		X								X		

APPROVISIONNEMENTS / ACHATS	SMQ		X								X		
	Actions à mettre face aux risques et opportunités		X								X		
	Identification des dangers et évaluation des risques et opportunités		X								X		
	Maîtrise des processus, produits et services fournis par des prestataires externes		X								X		
	Informations à l'attention des prestataires externes		X								X		
	Surveillance, mesure, analyse et évaluation des performances		X								X		
PRODUCTION /CONCEPTION ET DEVELOPPEMENT UTR	SMQ		X								X		
	Planification		X								X		
	Actions à mettre face aux risques et opportunités		X								X		
	Identification des dangers et évaluation des risques et opportunités		X								X		
	Réalisation des activités opérationnelles		X								X		
	Planification et maîtrise opérationnelles		X								X		
	Conception et développement de produits et services		X								X		
	Production et prestation de service		X								X		
	Libération des produits et services		X								X		
	Maîtrise des éléments de sortie non conformes		X								X		
	Surveillance, mesure, analyse et évaluation des performances		X								X		
	Amélioration		X								X		

PRODUCTION /CONCEPTION ET DEVELOPPEMENT UME	SMQ		X								X		
	Planification		X								X		
	Actions à mettre face aux risques et opportunités		X								X		
	Identification des dangers et évaluation des risques et opportunités		X								X		
	Réalisation des activités opérationnelles		X								X		
	Planification et maîtrise opérationnelles		X								X		
	Conception et développement de produits et services		X								X		
	Production et prestation de service		X								X		
	Libération des produits et services		X								X		
	Maîtrise des éléments de sortie non conformes		X								X		
	Surveillance, mesure, analyse et évaluation des performances		X								X		
	Amélioration		X								X		
INFORMATIQUE	SMQ		X								X		
	Planification		X								X		
	Actions à mettre face aux risques et opportunités		X								X		
	Identification des dangers et évaluation des risques et opportunités		X								X		
	Infrastructure		X								X		
	Surveillance, mesure, analyse et évaluation des performances		X								X		
HSE	SMQ		X								X		
	Planification		X								X		
	Actions à mettre face aux risques et opportunités		X								X		
	Identification des dangers et évaluation des risques et opportunités		X								X		
	Sensibilisation / Prise de conscience		X								X		
	Surveillance, mesure, analyse et évaluation des performances		X								X		
	Amélioration		X								X		

Annex No. 03: Annual Audit Program

Source: Internal Electro-Industries document

ENTREPRISE DES INDUSTRIES ELECTROTECHNIQUES
المؤسسة العمومية للصناعات الإلكتروتقنية
EPE / ELECTRO - INDUSTRIES / SPA
Société par actions au capital de 4. 753. 000. 000 DA

DIRECTION GENERALE
DEPARTEMENT QHSE - LABORATOIRE CENTRAL
REF N° :

Azazga le, ……..

A Tous les pilotes de processus

Objet : Planning de l'Audit interne S.M.Q

Mesdames, Messieurs

Dans le cadre de la surveillance de l'efficacité de notre **S**ystème de **M**anagement de la Qualité selon ISO 9001, un Audit Interne aura lieu **du …… au ……**, et sera réalisé par les équipes d'audit désignées dans le planning joint en annexe.

Meilleures salutations.

Le Chef de Département
QHSE – Labo Central

Copie : Mr Le P.

Adresse : BP 17 Route Nationale n° 12 Azazga – (W.) Tizi Ouzou
Tel.213- (026) 14.99.71 – Fax.213- (026) 14.98.00 – Email - contact.ei@electro-industries.com
Site - www.electro-industries.com

Planning d'Audit

DATE	Horaires	Processus	Pilote	Equipe d'Audit
……..	09h30 - 11h30	Ressources Humaines		04
	13h30 - 15h30	Approvisionnements & Achats		02
	13h30 - 15h30	Commercial		04
……	09h30 - 11h30	Conception et développement moteurs		01
	09h30 - 11h30	Maintenance		03
	13h30 - 15h30	Production moteurs		01
	13h30 - 15h30	Métrologie		03
……	09h30 - 11h30	Conception et développement Transformateurs		04
	09h30 - 11h00	Informatique		01
	13h30 - 15h30	HSE		02
	13h30 - 15h30	Production Transformateurs		03

Désignation des Equipes d'Audit

Equipe 1

- ✓ Mr — Chef d'équipe
- ✓ Mr

Equipe 2

- ✓ Melle — Chef d'équipe
- ✓ Mme

Equipe 3

- ✓ Mme — Chef d'équipe
- ✓ Mme

Equipe 4

- ✓ Mr — Chef d'équipe
- ✓ Mme

Annex No. 04: Audit Schedule

Source: Internal Electro-Industries document

ELECTRO INDUSTRIES **15300 AZAZGA - ALGERIE**	ENREGISTREMENT QUALITE **FICHE d'OBSERVATION d'AUDIT** **N° /**	CLASSEMENTS : ECART E/O Docu. Appl. DATE OUVERT :

OBSERVATION N° 01/01	ANNEE N° AUDIT N° d'ORDRE

AUDITEUR	**OBSERVATION / ECART / DERIVE :** VISA / Auditeurs **:** VISA /Accord de l'Audité **:**	
AUDITE	**Causes :** **Correction :** **ACTION CORRECTIVE PROPOSEE:** Date Cible : ……. VISA / Accord de l'Audité **: ……**	
RSMI	**1ère VERIFICATION / SUIVI de la MISE en ŒUVRE :** . Vérifié le : Nouvelle date Cible : …….. ……..……	Clôturée le : VISA:
1-DIR **2-RSMI**	**2ème VERIFICATION / concernant l'EFFICACITE :** . Vérifié le : Nouvelle date Cible : …….. ……..……	Clôturée le : VISA :

Annex No.05: Observation Sheet

Source: Internal Electro-Industries document

المؤسسة العمومية الإقتصادية للصناعات الإلكتروتقنية / شركة ذات أسهم " إلكترو ـ صناعية "
EPE / ENTREPRISE DES INDUSTRIES ELECTROTECHNIQUES
EPE / ELECTRO - INDUSTRIES / SPA
Capital Social 4.753.000.000 DA

DIRECTION GENERALE
DEPARTEMENT QHSE
LABO CENTRAL

Azazga, ……

RAPPORT D'AUDIT INTERNE DU SYSTEME DE MANAGEMENT DE LA QUALITE

Date d'audit : …….

L'auditeur :- …….

L'audité : - ……

Objectif de l'audit : Verification du Système de Managemaente de la qualité selon ISO 9001 Version 2015.

Processus audités	Constats d'audit	Chapitres ISO 9001 V2015
…….	**Points positifs :**……. ……. **Points d'amélioration** :…….. …….. **Points d'attention :** …….. …….. **Non-conformité mineure**…… …… **Non-conformité majeure** ……..	
…….	**Point positif :**……. ……. **Point d'amélioration** :…….. …….. **Point d'attention :** …….. …….. **Non-conformité mineure**…… …… **Non-conformité majeure** ……..	

Annex No.06: Audit Report

Source: Internal Electro-Industries document