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Quality Management

**Contribution to the implementation of an integrated management system in accordance with ISO 9001: 2015, ISO 14001 : 2015 and ISO 45001 : 2018 Standards.**

**Case: Equipment Manufacturing service - AMENHYD Spa**

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## Abstract

Over the last twenty years, companies have been faced with major new challenges in ensuring not only the improvement of their products and services but also the safety of people, working conditions as well as the environmental performance of the company. Consequently, concrete and measurable actions are required through voluntary commitment to a global QSE improvement approach: the integrated management system which allows organizations that implement it to obtain a competitive advantage over their competitors.

The objective of this work is mainly to prepare the prerequisites for the implementation of an integrated management system within equipment manufacturing service in the company « AMENHYD Spa » which is active in the field of water treatment and environment and also to allow AMENHYD Spa to prepare its triple certification based on *ISO 9001: 2015*, *ISO 14001: 2015* and *ISO 45001: 2018* standards.

**Key words:** Integrated Management System (IMS), ISO 9001, ISO 14001, ISO 45001, performance.

## Résumé

Depuis ces vingt dernières années, les entreprises se voient confrontées à de nouveaux défis de taille en assurant non seulement l'amélioration des produits et services mais aussi garantir la sécurité des personnes, les conditions de travail et les performances environnementales de l'entreprise. Par conséquent, des actions concrètes et mesurables sont demandées à travers l'engagement volontaire dans une démarche d'amélioration globale QSE : le système de management intégré qui permet aux organisations qui le mettent en place d'obtenir un avantage concurrentiel par rapport à ses concurrents.

L'objectif de ce travail est principalement de préparer les préalables de mise en place d'un système de management intégré au sein de service fabrication des équipements dans l'entreprise « AMENHYD Spa » qui est active dans le domaine de l'assainissement hydraulique et de l'environnement et ainsi de permettre à L'AMENHYD de préparer sa triple certification en s'appuyant sur les référentiels : *ISO 9001 : 2015*, *ISO 14001 :2015* et *ISO 45001 : 2018*.

**Mots clés :** Système de Management Intégré (SMI), ISO 9001, ISO 14001, ISO 45001, performance.

## الملخص

على مدار العشرين عامًا الماضية، واجهت الشركات تحديات كبيرة في ضمان ليس فقط تحسين المنتجات و الخدمات و لكن أيضًا ضمان سلامة الأشخاص ، ظروف العمل و الاداء البيئي للشركة. بالتالي، فإن الإجراءات الملموسة و القابلة للقياس مطلوبة من خلال الالتزام الطوعي بعملية تحسين تشمل الجودة، الصحة، والبيئة او ما يعرف بـ "نظام الإدارة المتكامل". هذا الأخير يسمح للشركات التي تنفذها بالحصول على ميزة تنافسية.

الهدف من هذا العمل بشكل أساسي هو إعداد المتطلبات الأساسية لتنفيذ نظام إدارة متكامل داخل في قسم تصنيع المعدات التابع لشركة "أمنهيد" التي تنشط في مجال الصرف الصحي و البيئة، إضافة الى تمكين الشركة من الاستعداد لاعتمادها للشهادة الثلاثية المتعلقة بالمعايير: ايزو 9001:2015، ايزو 14001:2015 و ايزو 45001:2018.

**الكلمات المفتاحية :** نظام الإدارة المتكامل، ايزو 9001:2015، ايزو 14001:2015، ايزو 45001:2018، الأداء.

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## **Abbreviations**

**IMS:** Integrated Management System

**QMS:** Quality Management System

**EMS:** Environmental Management System

**OHSMS:** Occupational Health & Safety Management System

**FMECA:** Failure Modes, their Effects, and their Criticality Analysis.

**AFNOR:** Association Française de Normalisation

**SWOT:** Strengths, weaknesses, opportunities and threats

**AMENHYD:** Aménagement Environnement Hydraulique (Development Environment Hydraulics)

**QHSE:** Quality, Health, Safety and Environment

**HLS:** High Level Structure

**TQM:** Total Quality Management

**BPR:** Business process reengineering

# **INTRODUCTION**

In a context marked by fierce competition and an increase in the level of demands, more and more companies are seeking global performance (L.Barmaki & Mokhtari, 2018). It has become essential for the organizations in the construction industry to measure their performance effectively for long-term survival in today's competitive business environment (Jha & Tripathi, 2018)

The adoption of management systems dedicated to quality, environment and safety in company, has become an important activity for such organizations. They are considered a symbol of success and a prerequisite for the survival and savings (time, cost, resources) (El Aoufir & Moumen, 2017)

Nowadays, a significant number of companies are constantly looking for new solutions in order to keep their market share (Rachidi, Dakkak, & Talbi, 2016) and to improve their business performance through the implementation of an Integrated Management System (IMS) particularly the international standards *ISO 9001: 2015, ISO 14001:2015 and ISO 45001:2018* (Purwanto, Hj. Ahmad, Asbari, Bernato, & Sihite, 2020)

In addition, the integration of Quality, Environment and Safety is an effective organizational approach to streamline work, avoid conflicts and reduce duplication of documents. It can eventually lead to cost savings and efficient use of resources within an organization (PECB, 2013). However, the IMS has the potential to create real benefits through delivering greater organizational and operational efficiency, effectiveness and improved performance (Bhutto & Griffith, 2014)

The triple QSE certification is now a guarantee of quality and confidence for partners and customers of companies that have it (Jadid, 2015). Besides, it has become a proof of competence for the companies and an object to be able to face the international market.

In construction, the client is often taken as the person or organization that procured a project (Majid & Rashvand, 2014). He is the owner of a construction project or buyer/seller of products or services (Haddadi, Johansen, & Andersen, 2016). On the other hand, the customer satisfaction can be seen either as a goal or as a measurement tool in the development of construction quality (Karna, Junnonen, & Sorvala, 2009).

When jointly implementing standards for management systems developed by ISO (such as *ISO 9001:2015, ISO 14001:2015, ISO 45001:2018* and others), the process of creating an integrated management system is greatly facilitated by the fact that all these standards are

developed using common approaches (Zaloga, Dyadyura, & Rybalka, 2019). The implementation of an IMS (QSE) began in the manufacturing industry, then currently being researched for its application in the construction industry (Masuin, Latief, & Zagloel, Development of Information System and Knowledge Management in Integrated Management System to Improve Organizations Performance of Construction Company in Construction Management Projects , 2020).

Thus, by implementing a management system standard, organizations can benefit from global management experience and good practice (Zainol, Ahmad, Zahid, & Ab Manaf, 2021). Moreover, The IMS can enable companies to benefit from the creation of synergies that are not only achieved to reduce time and costs associated with their implementation but also to improve efficiency (Masuin, Latief, & Zagloel, 2019).

Within the framework of the project, our research is part of the application of the process of setting up an integrated QSE management system according to the ISO 9001, ISO 14001 and ISO 45001 standards, starting with a description of the state of the organization through a diagnosis of the existing management system according to the standards requirements, in order to identify the strengths and weaknesses and to propose consequently improvement actions.

This research has a double interest. Firstly, it allows students and those who are interested to acquire knowledge on QSE management systems, namely, their fundamentals, their standards, their integration process, the HLS structure and many other essential related notions. Secondly, this research will allow us to apply the theoretical knowledge in order to set up an IMS (QSE) within AMENHYD; the main objectives can be summarized in the following points:

- Make an inventory of the existing management system of AMENHYD.
- Propose a relevant action plan which allows a better integration of the QSE fundamentals in the various activities of the company.
- Identify and formalize processes.
- Analyze and evaluate risks and opportunities of manufacturing equipment process.
- Identify and evaluate both of professional risks as well as the environmental impacts and aspects.

To carry out our work, we will try to answer the following research question:

**«How to successfully implement an integrated management system in accordance with the requirements of: ISO 9001:2015, ISO 45001:2015, ISO 14001:2018 standards within the company AMENHYD? »**

In order to clarify our research topic, we raised the above sub-questions:

- What is an integrated management system IMS (QSE)?
- How to carry out the existing management system diagnosis as well as the QSE diagnosis according to the requirements of ISO 9001: 2015, ISO 14001:2015 & ISO 45001:2018 standards ?
- What is the relevant action plan to be achieved during the implementation of an IMS (QSE) project within AMENHYD?

Therefore, to answer our research question, we first resorted in the theoretical part to a documentary research to impregnate and expand our knowledge in the field of the Integrated Management System (IMS). As the management systems are a topical issue, there are several books and articles that deal with quality, environment and even health and safety at work.

Secondly, on a practical part, we carried out semi-directive interviews (internal control questionnaire or checklist) with the AMENHYD's executives who offered us documents and reports that have facilitated our observation of QSE practices within the company.

The work that we have carried out is divided into three chapters, in the first chapter we will present a literature review that summarizes some previous studies that deal with similar themes to our study. Then, we will get to the conceptual framework which relates to the theoretical foundations of the integrated management system.

In the second chapter, we focus on the organizational context and the description of the methodology followed to solve our research question as well as the results obtained and tools implemented. Finally, the third chapter is divided into two sections. In the first section, we start by the diagnosis of the existing management system then we present the obtained results of the QSE diagnosis and the strategic analysis and the second section will expose the project of the implementation of an integrated management system.

**CHAPTER I: LITERATURE  
REVIEW & CONCEPTUAL  
FRAMEWORK**

## **Section one: Literature Review**

In this sense, the literature has reported scientific articles and academic works (Trierweiller, Borna, Spenassato, & Severo Peixe, 2016) which is conducted to find information from various research (Bernardo, Simon, Tari, & Molina-Azorín, 2015) by collecting, understanding, analyzing and then concluding on The Integrated Management System (IMS) (Radyawanto & Soediantono, 2022).

Hence, due to the literature review, we were able to identify the various theoretical approaches of The Integrated Management System (IMS) and its implementation particularly the *ISO 9001:2015* (Quality), *ISO 14001:2015* (Environment) and *ISO 45001:2018* (Safety) as well as a background on the perceived benefits in order to show the impacts of these standards on the performance of construction companies.

By the end of the scientific literature and after the gathering of necessary information from other studies, we accomplish a case study on preparing the implementation of an integrated management system in accordance with *ISO 9001:2015*, *ISO 14001:2015* and *ISO 45001:2018* requirements in AMENHYD's company by integrating the basic concepts of these standards.

### **ISO 9001:2015 Quality Management System**

Nowadays, organizations without quality do not survive (Santos, Murmura, & Bravi, 2019). Hence, there are many organizations that integrate QMS with other Management Systems, namely with Environmental Management System (EMS) and Occupational Health and Safety Management System (OH&SMS) among others (Carvalho, Santos and Gonçalves, 2018; Santos, Rebelo and Santos, 2017; Ribeiro et al., 2017)

A quality management system (QMS) defines the organization's structure, processes, procedures, and responsibilities to achieve quality policies and objectives. Successful implementation of a QMS improves service quality, organization performance, and customer satisfaction (Elsokhn, 2022).

The *ISO 9001:2015* is an internationally recognized standard for quality management systems, which provides the necessary resources to help an organization to improve its performance, based on the principle of plan-do-check-act, in order to obtain continuous improvement (Betlloch-Mas, Ramón-Sapena, Abellán-García, & Pascual-Ramírez, 2019).

It is reviewed every five years to ensure these standards remain up-to-date and in accordance with market needs (Fahmi, Mustofa, Rochmad, Wahyuni, & Irwansyah, 2021). Also, Betegon et al. (2021) define *ISO 9001* as « the international standard that provides a process-oriented approach to implementing a QMS in an organization » (Betegon et al., 2021).

Thus, until today, *ISO 9001* has undergone four successive revisions; in 1994, in 2000, in 2008 and the last revision in 2015 (Pyzdek and Keller, 2013; Demkiv, 2018)

Successful QMS implementation would boost continuous improvement and unleash potential advantages as improving the quality performance, overall business outcomes, and competitiveness of construction companies (Willar, Trigunarsyah, & Coffey, 2016).

Several successful practices that showed potential in the manufacturing sector are Total Quality Management (TQM), *ISO 9001*, Six Sigma, Lean and Business Process Reengineering (BPR) and others (Garza-Reyes, Rocha-Lona, & Kumar, 2014). Unlike the construction sector, which struggled to apply QMS to the industry (Sullivan, 2011).

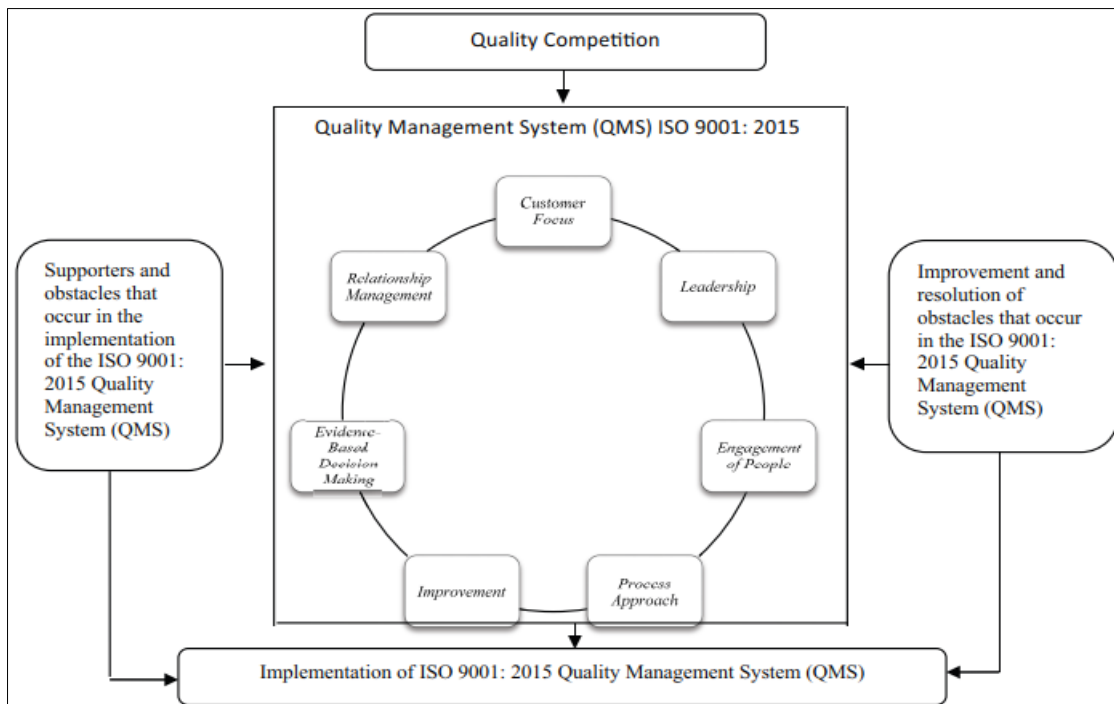
Consequently, towards an effective implementation process, Ahmed et al. (2017) attempted to develop a framework that integrates internal and external factors affecting QMS implementation in the construction industry.

Besides, Wibisono et al. (2017) noted that the *ISO9001:2015* has a risk-based approach. Therefore, organizations can formulate an implementation strategy. Mangula et al. (2013) also has the same view of his study, which concluded that the adoption of *ISO 9001: 2015* showed a considerable increase in performance in terms of quality and quantity of products.

The aim is to make organizations more flexible so as to increase their responsiveness to changing internal and external environments. Thus, organizations that comply with the standard have the assurance of providing products and services that will meet the needs and expectations of their customers, as well as the relevant legal and regulatory requirements (Betegon *et al.*, 2021).

The implementation of *ISO 9001: 2015* QMS is based on 7 quality management principles (Figure 1), namely customer focus, leadership, engagement of people, process approach, and improvement.

**Figure 1:** The quality management system process ISO 9001:2015.



**Source:** (Istriani & Rahardja, 2019)

### ISO 14001:2015 Environmental Management System

Construction is an important industry that contributes to the economic growth of developed and developing countries; however, the damage caused to the environment due to construction activities is indisputable (Bashir, Ojiako, Haridy, Shamsuzzaman, & Musa, 2021).

Accordingly, the International Organization for Standardization (ISO) has developed a series of voluntary standards and guidelines in the field of environmental management. The most important standard is *ISO 14001* which was introduced in 1996, the standard was modified again in 2004 (de Vries, Bayramoglu, & der Wiele, 2012). On September 15, 2015, the International Organization for Standardization (ISO) released the *ISO 14001: 2015* standard, which had revised previous versions of the system (ISO, 2015). It contains general guidelines, making it easier for any type and magnitude of organizations to run EMS (Anandagiri, Nowo, & Syahnoedi, 2021). The popularity of *ISO 14001* as an international standard for effective environmental management extends to the construction industry (Bashir, Ojiako, Haridy, Shamsuzzaman, & Musa, 2021).

*ISO 14001* (Environmental Management System) is a company management system that serves to ensure that the processes used and the products produced have fulfilled commitments to the environment, especially in the effort to fulfill environmental regulations, pollution prevention and commitment to continuous improvement (Fahmi, Mustofa, Rochmad, Wahyuni, & Irwansyah, 2021). Also, Anandagiri et al (2021) define *ISO 14001:2015* as « a standard that aims to be a frame of reference for organizations to protect the environment and respond to change by balancing sustainability pillars, namely environmental, social, and economy » (Anandagiri, Nowo, & Syahnoedi, 2021).

In addition, the successful adoption and implementation of *ISO14001:2015* standard operational as well as evaluation standard at every level of organization is important (Campos et al., 2015) because it involves the review of internal management processes to keep under control the environmental impact of its operations (Mafira, Mecca, & Muluk, 2020). Moreover, *the ISO 14001* standard covers the responsibilities of the project managers to employees, the public, and the environment (Orcos, Pérez-Aradros, & Blind, 2018). It is quite challenging to implement the *ISO 14001* standard in construction firms that are predominantly oriented around particular projects, as environmentally sustainable practices are often not embedded in project culture (Banihashemi et al. 2017; Carvalho and Rabechini 2017; Silvius 2017). By contrast, some studies have reported that adopting the *ISO 14001* standard helped firms to increase their environmentally sustainable practices.

According to Psomas et al. (2011) « The *ISO 14001* requirements and the company's issues with environmental performance are among the two common reasons for the implementation of this environmental management standard » (Psomas, Fotopoulos, & Kafetzopoulos, 2011). Besides, To et al. (2014) detect that the top motivating factors for adoption of the Environmental Management Standard are to promote environmental awareness among employees of environmental regulations, increase compliance to environmental regulatory, and improving efficiency (To et al. 2014).

*ISO 14001* Environmental Management System (EMS) is one of the most popular management systems in use. There are 307,059 organizations in 181 countries that have held *ISO 14001* certification (ISO, 2020) due to its several benefits. Firstly, it can reduce operational costs (Heras- Saizarbitoria, Arana, and Boiral 2016; Boiral et al. 2018; Wu et al. 2020; Brahmana and Kontesa 2021), protect the environment, and improve the firm's image and credit rating (Li et al. 2018). Secondly, it has the potential to reduce risk and

regulatory violations due to a better risk understanding approach (Vermeulen, 2018) and finally, it minimize potential conflicts between workers and employers in the provision of a decent healthy work environment (Fahmi, Mustofa, Rochmad, Wahyuni, & Irwansyah, 2021).

Thus, the standard does not require organizations to achieve a specified level of environmental performance, but it describes a system to help them achieve their own goals. The literature observes that adopting the *ISO 14001* standard allows organizations to achieve their objectives, while simultaneously responding to the needs of both stakeholders and legal requirements (Phan and Baird 2015; Waxin, Knuteson, and Bartholomew 2019; Bravi et al. 2020).

### **ISO 45001: 2018 Safety Management System**

Over the past years, construction became a heavy work which involves many elements, not only humans as workers but also other supporting elements. From the use of heavy equipment to the involvement of large amounts of material (Asih & Latief, 2021). According to the International Labour Organization, more than 7.600 people die due to accidents or occupational diseases every single day (Purwanto, Abidin, & Suhendra, 2020). Therefore, all construction companies must implement a Workforce Safety and Health System which is an important aspect in a project which means to protect workers from the risk of accidents (Asih & Latief, 2021).

Initially, *ISO 45001: 2018* was published on March 12, 2018 and this standard is a guideline in the implementation of an occupational health and safety management system by providing a series of powerful and effective processes to improve OHS performance in the workplace (ISO, 2018). According to Uzun et al. (2018), *ISO 45001* describes a more advanced management system than OHSAS 18001 does, with more clearly defined terms, definitions and scope. The process starts with leadership and commitment, followed by planning involving context analysis, operational planning, risk assessment, and control. (Purwanto, Hj. Ahmad, Asbari, Bernato, & Sihite, 2020).

Furthermore, *ISO 45001: 2018* is intended to be applicable to every organization regardless of size, type and nature in order to help organizations manage *ISO 45001* risks and proactively improve *ISO 45001* performance (Syahrullah & Febriani, 2019) .

Also, to provide support for all organizations in their effort to provide healthy and safe workplaces, to preserve the wellbeing of their workers and to prevent work accidents and ill-health (ISO/DIS 45001, 2018).

One of the greatest particularities is that its structure is based on the so-called high-level structure defined in Annex SL, which guarantees its compatibility with other management systems, such as ISO 9001 and ISO 14001. However, The *ISO 45001* adoption is much easier if the organization has an existing ISO Management System (as *ISO 9001* or *ISO 14001*), because some common processes will be in place (Draghici, Ivascu, & Neag, 2020). The main advantage of the Annex SL – the new ISO high level structure (HLS) is that it can be easily integrated into management system standards, such as quality, environment and social responsibility (Bejinariu et al, 2017; Darabont et al, 2017; Ivascu and Cioca, 2014; Mihai-Adrian et al, 2017 and Moraru et al, 2014). The structure of *ISO 45001* is presented in *Table 1*.

**Table 1:** Structure of ISO 45001

<i>No.</i>	<i>Chapter</i>
1	Scope
2	Normative references
3	Terms and definitions
4	Context of the organization
5	Leadership and worker participation
6	Planning
7	Support
8	Operation
9	Performance evaluation
10	Improvement

**Source:** Environmental Engineering and Management Journal, 2018

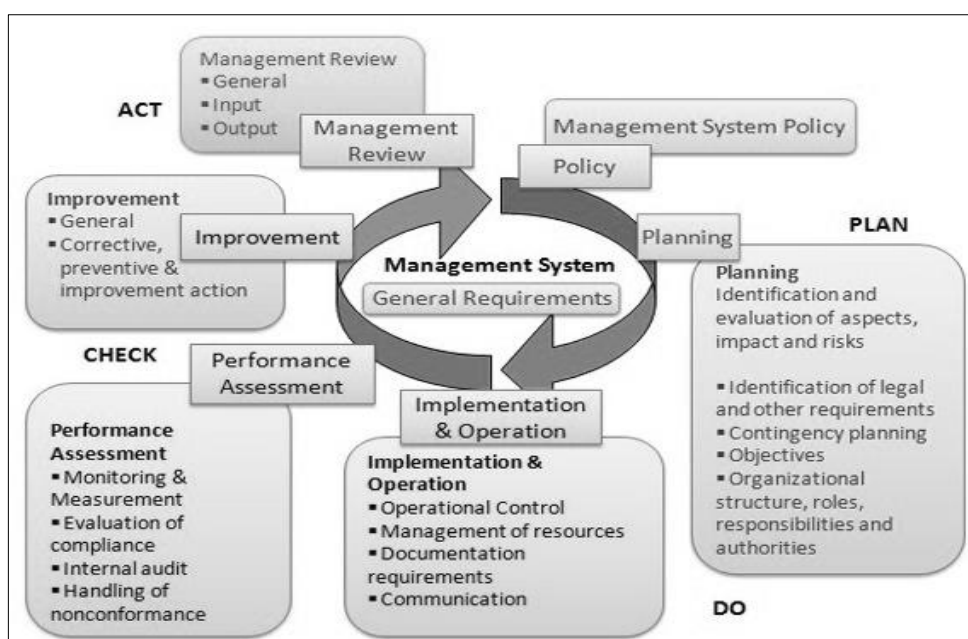
a. *QSE Integration Approaches :*

According to (Bennouna, Amegouz, & Sekhari, 2020), there're several approaches of QSE integration allow unifying the three management systems (quality, environment, occupational health and safety) and many authors have suggested various integration methodologies.

First, we find the PDCA logic (Figure 2) which constitutes one of the pillars of all management systems and allows them to be dynamic instead of static, and constantly improving. This finding is also confirmed by Savino and Mazza (2014), who explained how integrated environmental and quality continuous improvement can occur through a practical implementation of PDCA cycle.

Secondly, the risk management as it has been used for ISO 45001. Thirdly, a survey conducted in Spain by (Simon, Karapetrovic, & Casadesus, 2012) shows that the analysis of common elements of standards and process map are the most common methods used during the integration process. Therefore, we discover the notion of generic processes, a new concept that facilitates the integration of systems, as confirmed by Harmand and Ekcl (2007).

**Figure 2:** The Plan, Do, Check, Act Cycle



**Source:** (Steynberg & Bruyn, 2017)

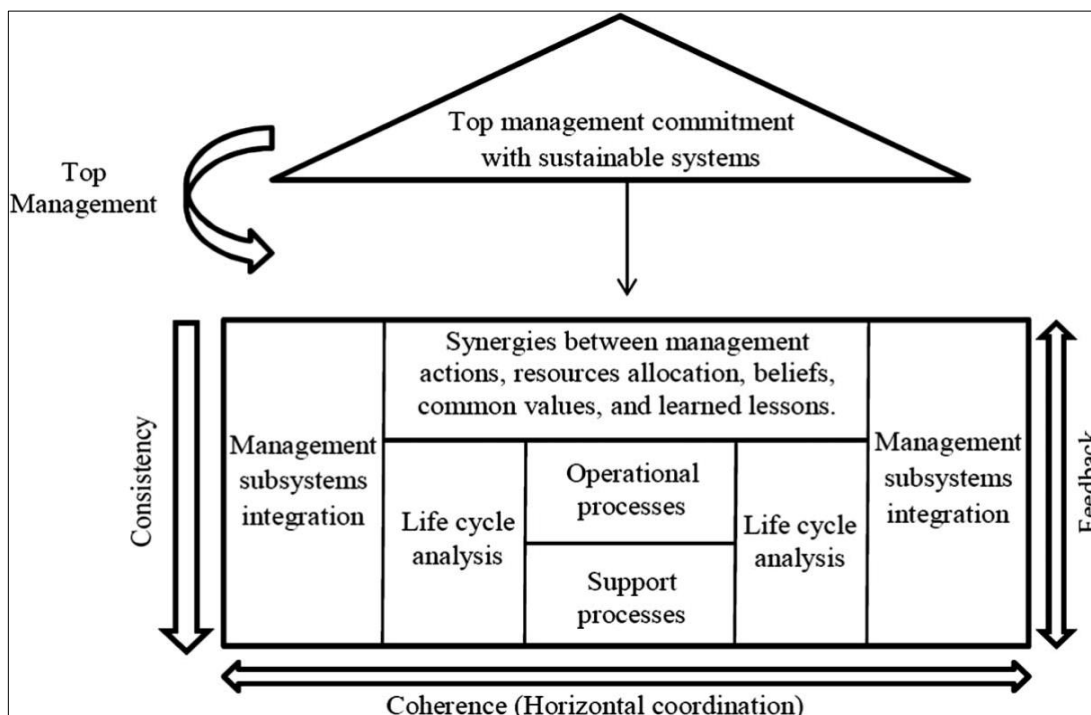
*b. Integration strategy:*

The integration strategy discusses about the sequence or order in which the integration process is implemented by organizations. According to (Nunhes, Motta, & Oliveira, 2016) , there're two possible strategies that have been indicated by their previous studies. The sequential integration which implements the quality and then implements and integrates other systems and the simultaneous integration, that all systems are implemented in an integrated manner.

Unlike Asif et al. (2010) who distinguished between two integration strategies archetypes: the systemic approach and the techno-centric approach. This latter approach promotes benefits at an operational level while the former improves IMS uniformity and homogeneity, assuming that stakeholders' requirements are properly identified and complied with.

The same authors suggested a tri-dimensional approach as the most suitable integration strategy, as shown in Figure 3:

**Figure 3:** Strategy based on vertical and horizontal subsystems integration



**Source:** (Domingues, Sampaio, & Arezes, 2014)

c. *Integration Models:*

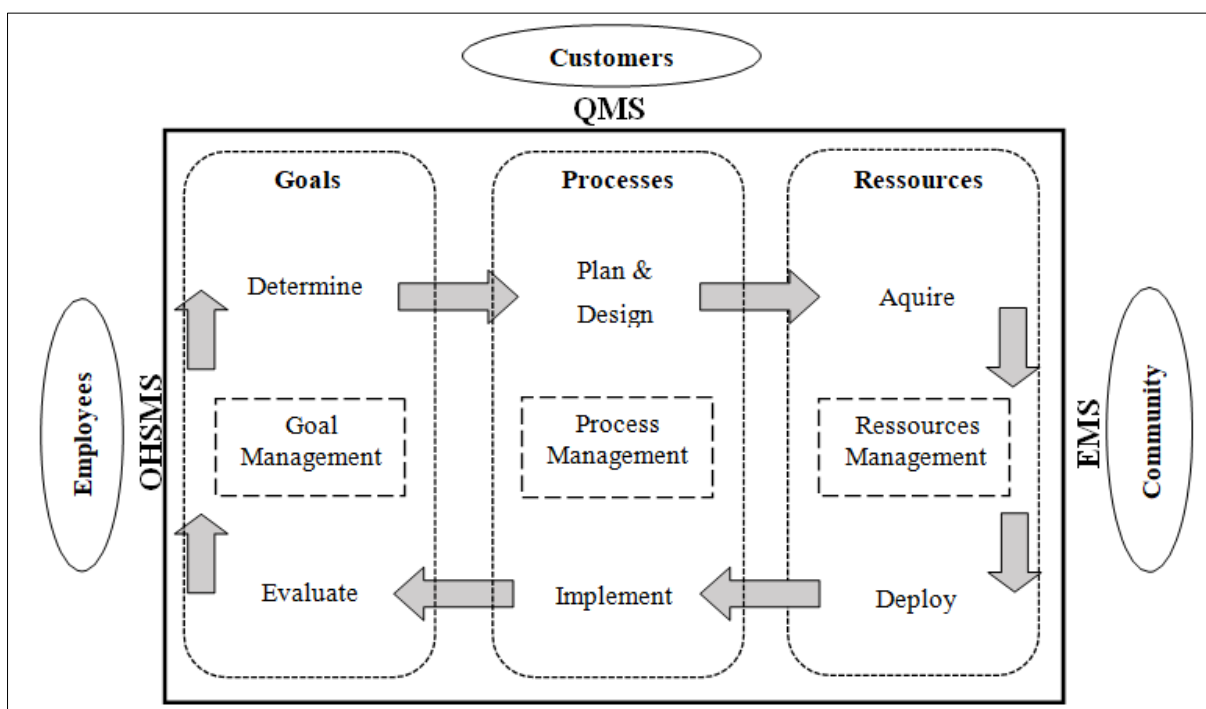
Integration models are theoretical and conceptual descriptions proposed to organizations on how integrated management should be implemented.

According to (Moumen & Knouch, 2018), two essential models that should be considered: The systematic Model which is suggested by (Karapetrovic & Jonker, 2003) and it focus on how to link the three management systems (quality, environment, occupational health and safety).

It is based on finding a balance between objectives, processes and resources as shown in Figure 4.

The second one is the synergetic model which is based on synergy between the various requirements of ISO 9001, ISO 14001, and OHSAS 18001 (Documentation, Policies, Objectives, Management Commitment, Continuous Improvement, Audit and Internal Communication).

**Figure 4:** The Systematic Model of Integrated Management



**Source:** (Karapetrovic & Jonker, 2003)

*d. The motivations of integration:*

Given the motivation that led the organization to integrate the management systems, like Karapetrovic (2006) and Santos (2011), managers claimed image improvement as a marketing tool and improved relations with stakeholders, as well as the optimization of processes, reduction of documents and improving internal organization as the main motivations for integrating management systems (Table 2)

**Table 2:** Motivations for the integration of management systems.

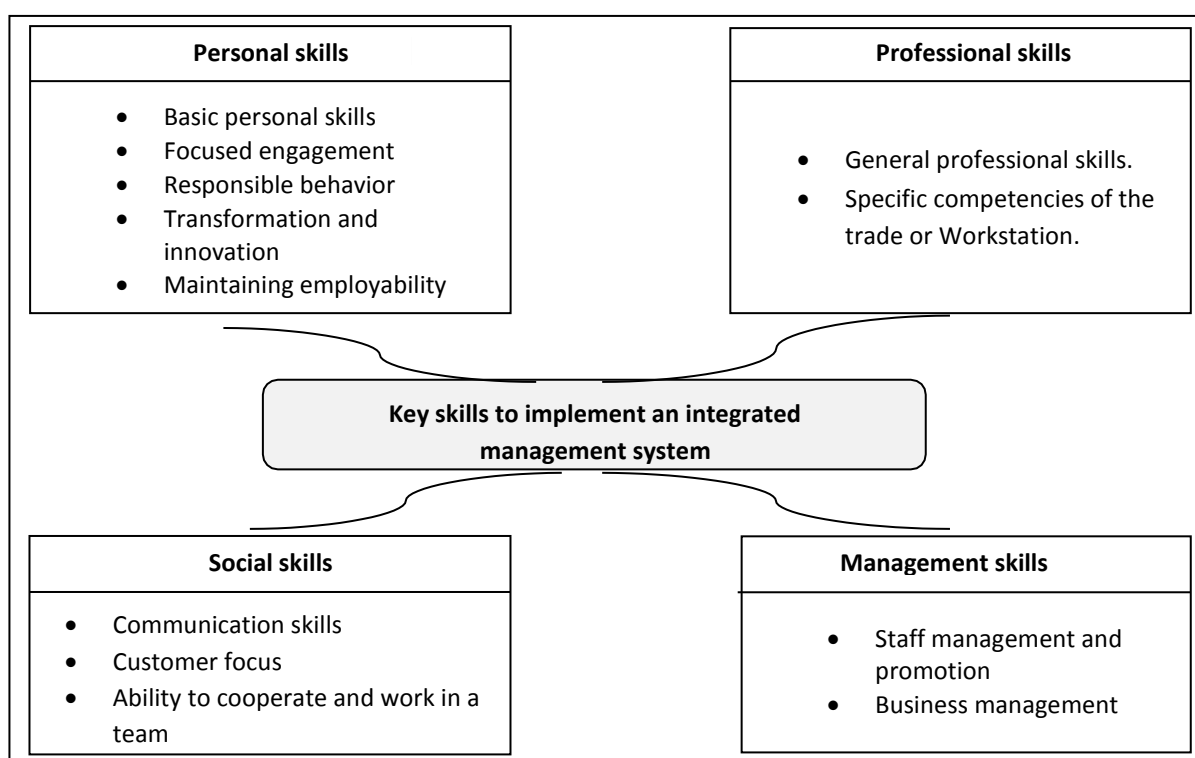
	High level of integration		Low level of integration	
Marketing tool / image improvement	X	X	X	X
Internal process optimization	X	X		
Marketing differentiation	X			
Give response to customers with specific demands	X			
Improve effectiveness and control of systems	X			
Top management decision		X		
Economic support for investment projects		X		
Cost reduction associated to resources involved		X		
Customers and suppliers relationship improvement			X	
Internal organization improvement			X	
Documents reduction			X	X

**Source:** (Almeida, Sampaio, & Santo, Integrated management systems–quality, environment and health and safety: motivations, benefits, difficulties and critical success factors, 2012)

e. *The skills needed for an effective integrated management system :*

Considering the importance of human resources in the implementation and monitoring of an effective QSE approach, (Dakkak, Rachidi, & Talbi, 2016) proposed to place a skills repository at the center of it. The skills repository refers to the formalized document of the company that identifies the skills required to perform a job (Dietrich, 2008). The following figure proposes four main groups of skills to deploy an IMS in a safe and efficient way (Figure 5).

**Figure 5:** Key skills to deploy an IMS.



**Source:** (Dakkak, Rachidi, & Talbi, 2016)

## **Section two: Conceptual framework**

The integrated management system has become a global tool for decision support and risk control. It involves integrating multiple internal and external requirements within the same organization: quality, health & safety, environment, legal and regulatory requirements and others from reference systems specific to the activity (industry, services, health, etc.).

In this section, we will attempt to present the theoretical framework of the integrated QSE management system, starting with a brief presentation of the three management systems Quality, Environment, Health and safety, the process of their integration, the various issues and objectives of an IMS, as well as the advantages and barriers to its implementation.

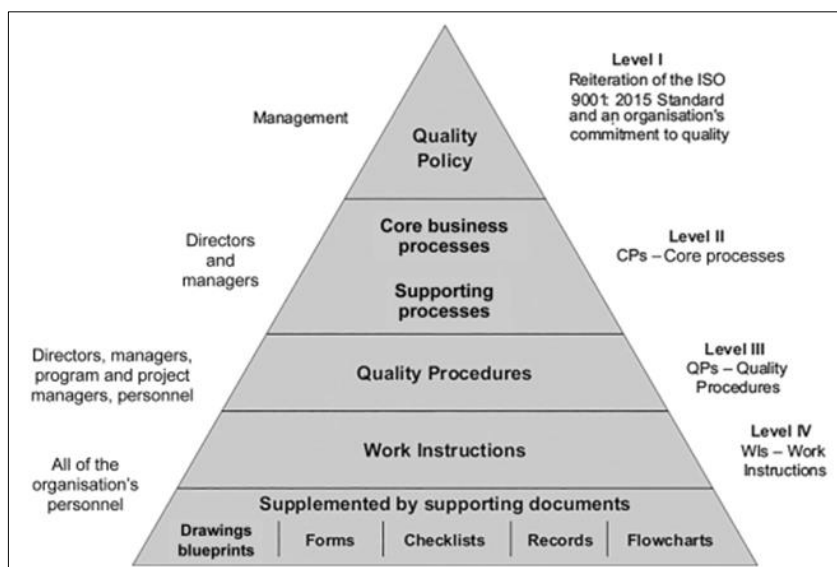
## 1. Presentation of the Quality, Safety and Environmental Systems:

### 1.1 The Quality Management System:

#### 1.1.1 Definitions:

- The most commonly accepted meaning of Quality is that expressed by the International Organization for Standardization (ISO), namely: « *The totality of features and characteristics of products and services or service that bear on its ability to satisfy stated or implied needs.* » In simpler words, we can say that a product or service has good quality when it « *complies with the requirements specified by the client.* »
- A Quality Management System (QMS) includes the activities by which the organization identifies its objectives and determines the processes and resources necessary to achieve the desired results. The QMS manages the processes and their interactions, the resources needed to deliver value and achieve results for relevant stakeholders. (*ISO 9000, 2015*)
- According to *ISO 19011*, Quality Management System is the organizational structure (Figure 6) of policies, procedures, work instructions and resources that together provide processes focused on achieving quality policy and quality objectives to meet customer requirements.

**Figure 6:** Quality Management System structure

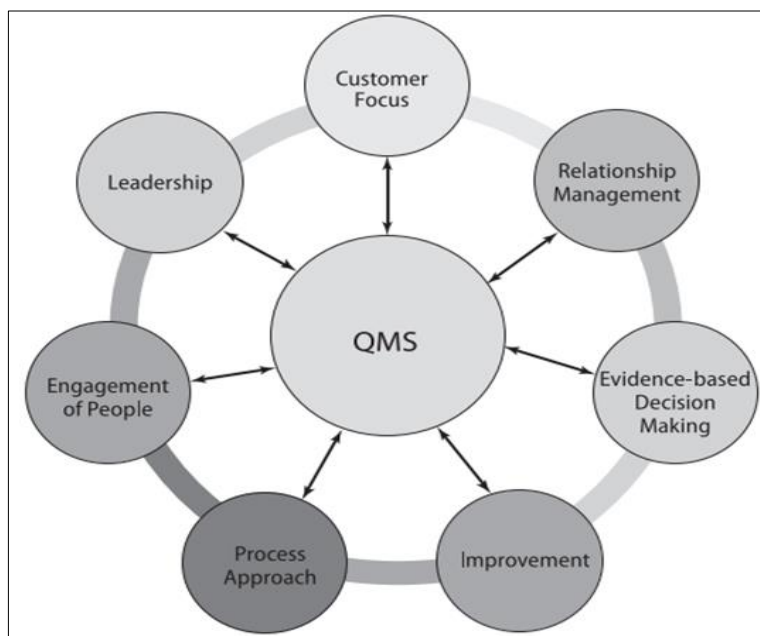


**Source:** (Tricker, 2020)

### 1.1.2 Quality Management System Principles:

The implementation of a Quality Management System (QMS) is necessary to successfully manage an organization. For this reason, *The ISO 9001: 2015* standard identifies seven quality management principles (Figure 7) that allow organizations to continuously improve their performance, while meeting the needs of all stakeholders (customers, employees, shareholders, suppliers, partners..etc).

**Figure 7:** The 7 quality management principles based on the international standard ISO 9001:2015



**Source:** (Luburić , 2015)

- Customer Focus :

Companies depend on their customers, so they must understand their present and future needs and expectations meet their requirements and strive to exceed their expectations. Customer orientation means setting up a real communication process with them, a prospective analysis of their needs, a regular evaluation of their level of satisfaction and the processing of their complaints.

- Leadership :

In any Quality Management System, Top Management must clearly define its strategic directions and create the conditions for staff to fully participate in the process.

To do this, it must set an example and show real commitment, define motivating objectives and create shared values.

- Engagement of people :

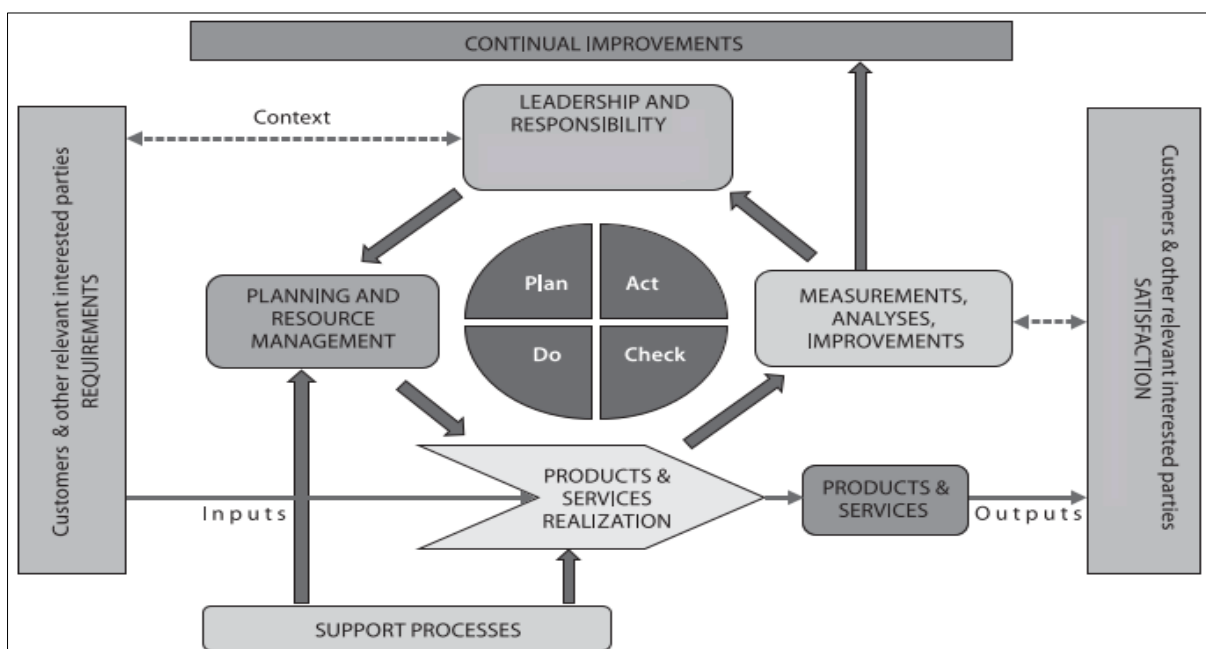
People are the most important factor of success and the very essence of an organization.

The task of the organization's management is to exercise their duties professionally, consciously and responsibly as well as to discover how to include its employees into making important decisions as that will make them accept as their own, and they will feel a greater responsibility and the obligation to implement them. (Luburić , 2015)

- Process Approach :

Any Quality Management System requires a process approach. This approach consists in determining the company's processes, their interactions and monitoring criteria. On this basis, it will be possible to pilot each process, to analyze their performance, make proposals for improvement and implement them in order to contribute to the company's strategic objectives.

**Figure 8:** Process approach based model of quality management system



**Source:** (Luburić , 2015)

- Improvement :

Continual improvement is defined as the purpose of managing each process, while improvement, as a wider term, in addition to continual improvements and innovations, means refractive changes, corrective measures, and reorganization (ISO, 2015). An organization has to choose and use applicable tools and methodologies for researching samples and unsatisfactory performance and as a support to continual improvement. One of them is the PDCA (Plan Do Check Act) methodology which is represented in the Deming wheel to designate the following four times.

**Plan:** It is necessary to plan all the actions to be carried out for a progress compared to the strategic objectives and the policy of the company;

**Do:** We must ensure that the improvement actions already planned are carried out;

**Check:** Once the actions have been carried out, their effectiveness must be verified. It is necessary to note that the initial objective has been achieved and that the implementation of this action is guiding the company towards its strategic objectives;

**Act:** For each action, a reaction must follow the verification, whether the action has achieved its objective or not.

- Evidence-based decision making:

Every manager knows that making a decision means taking a risk. In order to make the right decisions, we must be able to rely on reliable information. This information must therefore be available and in a form that allows it to be analyzed and understood. In many cases, the implementation of relevant indicators and dashboards can meet this need and facilitate decision making.

- Relationship Management :

A company and its suppliers are interdependent and the principle of mutually beneficial relationships will increase their ability to create value. To achieve this, it is necessary to understand the interests of the partners clearly define their obligations and regularly evaluate their performance.

### **1.1.3 Benefits of Quality Management System:**

Implementing a quality management system affects every aspect of an organization's performance, among the benefits of QMS implementation based on the *ISO 9001* standard, there are:

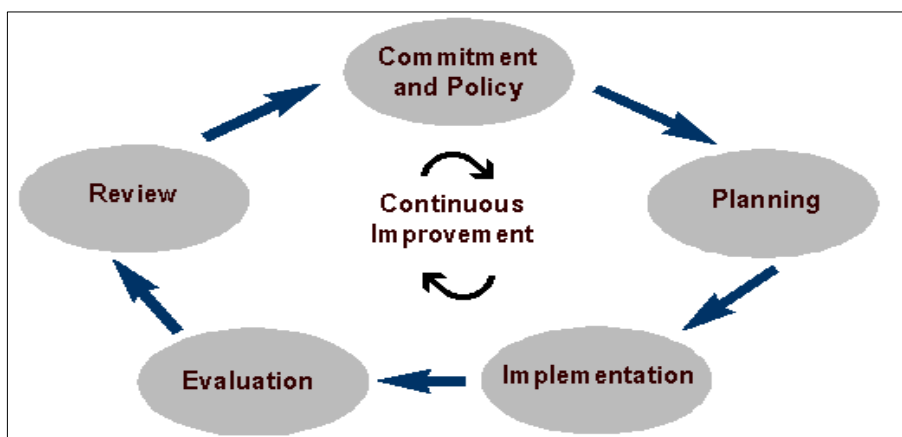
- Understanding the business through the identification and description of processes.
- Quality improvement of the processes, and consequently, the quality of the products offered.
- Reduction of the non-conformity costs, which makes it possible to offer a better quality/price ratio.
- Involvement of staff through new responsibilities and commitment to the management system and participation in its implementation.
- Identification and facilitating the training opportunities.
- Ensuring good working conditions.
- Customer satisfaction improvement.
- Development of customer relations and listening skills.

## 1.2 The Environmental Management System:

### 1.2.1 Definitions:

- The new definition of an Environmental Management System according to *ISO 14001:2015* states that EMS is «*The component of the management system used to manage environmental aspects, meet compliance obligations, and address the risk associated with threats and opportunities*» (SYLVIE , 2015)
- ISO 14001:2015 specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance and achieve the intended outcomes of its environmental management system, which provide value for the environment, the organization itself and interested parties. (ISO) ([www.iso.org](http://www.iso.org) , accessed on April 05,2022)
- One of the fundamental aims of an EMS is to define the environmental aspects of an organization’s activities which can possibly have negative impacts on the environment and find ways to continuously improve its environmental performance. The system follows a repeating cycle (Figure 9).
- According to *ISO 14001: 2015* Environmental management system; Requirements and guidelines:
- Environmental aspect is defined as: «*an element of an organization’s activities, products or services that interacts or can interact with the environment.* »
- Environmental impact refers to «*changes to the environment, whether adverse or beneficial, wholly or partially resulting from an organization’s environmental aspects.* »

**Figure 9:** The continuous improvement cycle



Source: (<https://www.epa.gov/> , accessed on April 07, 2022)

### **1.2.2 Environmental Management System Principles:**

In general, environmental management according to ISO 14001 imposes four fundamental principles on the company:

- Compliance with regulatory and legislative requirements: there are cases where the organization does not strictly comply with the regulations.
- Adoption of the principle of continuous improvement of environmental protection within the company by designing, implementing, monitoring, evaluating and systematically improving all processes and products with a view to economical use of raw materials and limiting emissions and risks.
- Strengthening the company's own environmental responsibility.
- The implementation of an open information policy on environmental protection.
- Control and prevention of risks.

Source: (<https://www.atedev.fr/> , accessed on April 11, 2022)

### **1.2.3 Benefits of Environmental Management System:**

According to the international standard ISO 14001:2015, the benefits of Environmental Management System can be summarized as:

- Environment protection by eliminating or mitigating adverse environmental impacts.
- Limiting the potential negative effect of environmental conditions on the organization.
- Organization assistance in meeting compliance obligations.
- Communicating environmental information to interested parties

Besides, there're other benefits of EMS according to (Halдар, 2018) such as:

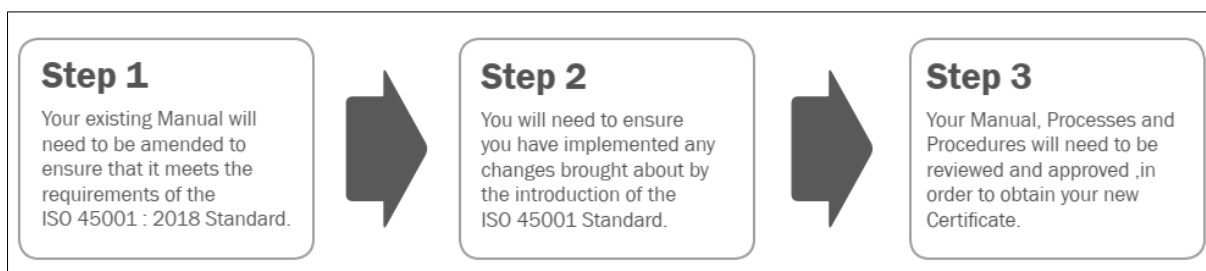
- Maximizing the efficient use of resources.
- Waste generation reduction by proper planning.
- Motivating awareness of environmental concern among all levels of employees.
- Demonstration a well-accepted corporate image.

### 1.3 The occupational Health and Safety Management System:

#### 1.3.1 Definitions:

- *ISO 45001: 2018* is the new international standard for Occupational Health and Safety Management Systems. Although similar to *OHSAS 18001*, the new *ISO 45001* adopts the high-level framework of Annex SL for all new or revised ISO standards for management systems. It is applicable to any organization that wishes to establish, implement and maintain an OHS management system to improve occupational health and safety, eliminate hazards and minimize risks. (ISO, 2018)
- According to the international standard *ISO 45001: 2018*, The Occupational Health and Safety Management System can be defined as «*a management system or part of a management system used to implement the OHS policy.*»
- However, an OHSMS is considered to be a management system designed to help organizations of all sizes and in all sectors to create and implement proactive prevention systems against occupational accidents and diseases and to improve the occupational health and safety performance of an organization.
- An occupational disease is a health condition or disorder (e.g., cancer, musculoskeletal disorders, post-traumatic stress, etc.) that is caused by your work environment or activities related to your work. (<https://www.ccohs.ca/> , accessed on April 14, 2022)
- An occupational accident is a sudden and unexpected accident caused by external factors due to which the employee suffers injuries.

**Figure 10:** ISO 45001: 2018 Upgrade Process



**Source:** (<https://www.qmsuk.com/> , accessed on April 07, 2022)

### **1.3.2 Occupational Health and Safety Management System Principles:**

The implementation of an occupational health and safety management system is based on several principles such as:

- The effectiveness of the implemented processes for the identification of hazards, the control of risks and the evaluation of opportunities for occupational health and safety.
- Organizational commitment, responsibility and accountability of management.
- Communication, consultation and participation of workers.
- Allocation of resources to achieve the expected objectives.
- The development of a culture that supports the expected results of the OHS management system
- The compatibility of occupational health and safety policies with the organization's overall strategic directions.
- Compliance with legal and regulatory requirements
- The adequacy of the occupational health and safety objectives with the occupational health and safety policy

### **1.3.3 Benefits of Occupational Health and Safety Management System:**

The adoption of an Occupational Health and Safety Management System has several benefits for the company which will help it improve its performance, such as:

- Reduction of accidents and occupational diseases.
- Ensuring the prevention and protection of workers.
- Creating a health and safety culture that encourages employees to take an active role in their own OHS.
- Reducing the cost of insurance premiums, which reduces the need to seek for short or long-term replacements.
- Ensuring the effectiveness of risk control measures and OHS procedures.
- Improving the company's image by establishing a climate of trust with interested parties.

## **2. Similarities and differences of Quality, Safety and Environment:**

### **2.1. The similarities and differences between the Quality, Safety and Environmental approaches:**

#### **2.1.1 Similarities:**

The piloting of the implementation of each system has major organizational similarities, common requirements or similar principles are present in each of the three reference systems. This include, for example:

- *Management commitment* through the provision of human, technical and financial resources; planning; regulatory and legal monitoring and compliance of the company, communication. This commitment will be concretized for each of the three systems by the definition of the Policy, which is itself broken down into objectives.
- *The training and the awareness* of the actors concerned (staff involvement) in order to: Documentary control, Control of the means of control and monitoring, Monitoring and measurement of performance.
- *Continuous improvement*: modeled as a wheel called "DEMING WHEEL" (plan, do check, act) as we presented above in Figure 9.

#### **2.1.2 Differences:**

The differences between the Quality-Safety-Environment approaches are often cited to justify the different standardization of management systems, the main differences are related to:

- The interested parties.
- The scope of application.
- The results and their measurement.
- The intentional character of the aspects taken into account.
- The techniques used.
- The emergency procedures and communication.

**Table 3:** Differences between the quality, safety and environment approaches

	<i>Quality</i>	<i>Environment</i>	<i>Safety</i>
Sectors concerned	<ul style="list-style-type: none"> <li>- The company (economic aspects)</li> <li>- The market</li> </ul>	<ul style="list-style-type: none"> <li>- The Neighborhood</li> <li>- The community</li> </ul>	<ul style="list-style-type: none"> <li>- Users</li> <li>- The staff</li> </ul>
Management Purpose	<ul style="list-style-type: none"> <li>- Satisfaction of customers and other stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>- Compliance with requirements (laws and regulations)</li> </ul>	<ul style="list-style-type: none"> <li>- Prevention of the risk of occupational accidents and diseases</li> </ul>
Scope of application	<ul style="list-style-type: none"> <li>- Intentional Product Compliance</li> </ul>	<ul style="list-style-type: none"> <li>- Nuisance prevention (unintended products)</li> <li>- Use of natural resources</li> <li>- Evolution of transformation processes</li> </ul>	<ul style="list-style-type: none"> <li>- People (injuries)</li> <li>- Facilities (operational safety)</li> </ul>
Communication	<ul style="list-style-type: none"> <li>- Highly recommended</li> </ul>	<ul style="list-style-type: none"> <li>- Mandatory internally and externally</li> </ul>	<ul style="list-style-type: none"> <li>- Recommended</li> </ul>
Emergency procedures	/	<ul style="list-style-type: none"> <li>- Mandatory</li> </ul>	<ul style="list-style-type: none"> <li>- Mandatory</li> </ul>
Measurement of results	<ul style="list-style-type: none"> <li>- Customer satisfaction</li> <li>- Non-quality costs</li> <li>- Performance (cost reduction, lead time.)</li> </ul>	<ul style="list-style-type: none"> <li>- Measurement of pollution, discharges, waste, savings.</li> </ul>	<ul style="list-style-type: none"> <li>- Indicators relating to accidents and social climates.</li> </ul>

**Source:** Elaborated by our care (inspired by Froment, 1999)

**2.2. The similarities and differences between the requirements of ISO 9001: 2015, ISO 14001: 2015 and ISO 45001: 2018 standards:**

Core process	Similarities	Differences
Planning and risk management	Documenting: <ul style="list-style-type: none"> <li>• The context of the organization</li> <li>• Any interested parties</li> <li>• The scope of the management system</li> <li>• IMS objectives and your plans to achieve them</li> </ul>	<p><b>9001:</b> identifying risks and opportunities relating to the processes created as well as quality objectives and your plans to achieve them.</p> <p><b>14001:</b> the environmentally-specific systems and plans of action as well as the environmental objectives and plans to achieve them.</p> <p><b>45001:</b> evaluating the hazards that could arise and then assess, control or eliminate them and outlining the OH&amp;S objectives and plans to achieve them.</p>
Operations process	Planning and implementing good business practice that measures, analyses and improves IMS. This will include: <ul style="list-style-type: none"> <li>• Demonstrating conformity to both the product requirements and management system</li> <li>• Continual improvements of the IMS</li> <li>• Evaluation of compliance</li> </ul>	<p><b>9001:</b> Monitoring and measuring processes. It will also require details on production and service provision and the release of products and services.</p> <p><b>45001:</b> A few additional things will need to be considered for this Standard:</p> <ul style="list-style-type: none"> <li>• The process for eliminating hazards and reducing occupational health and safety risks</li> <li>• The process for implementing and controlling temporary and permanent changes that affect health and safety</li> </ul> <p><b>14001 &amp; 45001:</b> These Standards also share some requirements:</p> <ul style="list-style-type: none"> <li>• The process for preparing for emergency situations</li> <li>• The process for evaluating compliance with legal requirements</li> <li>• Compliance with the IMS</li> </ul>
Design and development	This clause is only relevant to the <b>ISO 9001</b> .	<p><b>9001:</b> putting a procedure in place to identify and correct a product or service that does not meet customer or business requirements (non-conforming products).</p>
Leadership, training and competence	Demonstrating all aspects of leadership, training and commitment. This includes: <ul style="list-style-type: none"> <li>• Roles, responsibilities and authorities</li> <li>• Resources</li> <li>• Competence</li> <li>• Awareness</li> <li>• Communication</li> <li>• People</li> </ul>	<p><b>45001:</b> Involving the workers in the system by providing training and resources for participation, encouraging participation and removing obstacles for participation.</p>

Maintenance	This clause is only relevant to the <b>ISO 9001</b> .	<b>9001:</b> providing information on the following: <ul style="list-style-type: none"> <li>• Awareness of environmental aspects associated with work</li> <li>• Communication of reliable environmental information and changes to the environmental management system</li> <li>• Any machinery that needs calibration</li> </ul>
Purchasing	This clause is only relevant to the <b>ISO 9001</b> and <b>45001</b> .	<b>9001:</b> recording evidence relating to the selection and monitoring of suppliers.  <b>45001:</b> keeping evidence relating to procurement, including contractors and outsourcing.
Monitoring and measurement	This clause covers all aspects of monitoring, measurement, analysis and evaluation: <ul style="list-style-type: none"> <li>• What needs to be monitored and measured</li> <li>• The method for monitoring</li> <li>• When monitoring takes place</li> <li>• When the results are to be analyzed</li> </ul>	This clause is fully relevant to all Standards.
Document management	This relates to the control and maintenance of information needed to control the management system.	This clause is fully relevant to all Standards.
IMS management system	Demonstrating the processes that will help to develop, implement and improve IMS.	<b>45001:</b> establishing a process for the control and implementation of changes that affect Occupational Health & Safety such as changes to work locations, changes in knowledge or new products.
IMS Policy	Providing evidence that an IMS policy has been created and is now being reviewed and maintained.	This clause is fully relevant to all Standards.
Corrective actions and improvement	This clause requires you to find opportunities for improvement and to work to meet customer requirements.	<b>9001:</b> control detail mechanisms to prevent poor- quality products and services (non-conforming outputs).  <b>45001:</b> putting a process in place for investigating and logging incidents and taking action to correct them.
Internal Audit	Conducting an internal audit for both standards at regular intervals.	This clause is fully relevant to all Standards.
Management Review	An internal IMS Management Review must be carried out to cover both Standards at regular intervals.	This clause is fully relevant to all Standards.

**Table 4:** The differences and similarities between quality, health safety and environment management systems. (<https://www.qmsuk.com/> , accessed on April 19, 2022)

### 3. The Integrated Management System IMS:

#### 3.1 Definitions:

- An integrated management system is defined by AFNOR as « *an approach that aims at taking into account in a global and coherent way, the requirements of the different themes quality, environment and security.* »
- According to Dakkak and Talbi, the Integrated Management System (QSEMS) is defined as « *a system that allows establishing and deploying quality, environmental and occupational health/safety objectives to increase their synergy and effectiveness* » (Dakkak , Talbi, Chater, & Guennoun , 2013)
- According to Goinard, « *a quality management system seeks first and foremost customer satisfaction. On the other hand, the IMS goes beyond customer satisfaction it seeks the protection of the environment and the staff safety while taking into consideration the stakeholders* » (Goinard, 2006), we therefore deduce an evolution in the notion of customer and a wider consideration of interested parties.
- An Integrated Management System (IMS) combines all aspects of an organization's systems, processes and Standards into one smart system due the Annex SL high-level structure.
- In general, we define The Integrated Management System (IMS) as a voluntary managerial approach initiated by the company's management which concerns at the same time the management of quality, health and safety and the environment within the same system and gathering them in a unique and well harmonized structure, while taking into account the nature of the activity, the human and financial resources with the aim of the continuous improvement of the company's global performance.

**Figure 11:** The integration of the QMS, EMS and OHSMS according to ISO 9001:2015, ISO14001:2015 and ISO 45001: 2018 standards.



Source: (<https://www.qmsuk.com/> , accessed on April 21, 2022)

### 3.2 Issues and Objectives of IMS:

#### 3.2.1 Objectives of IMS:

The IMS has several objectives since it harmonizes certain variables in a global approach, but its main objectives are:

- The search for economic gains through the optimization of processes and resources.
- Rethinking the company into an efficient and agile system.
- The concern to simplify the organization by avoiding any overlapping, competition or inconsistency between the various integrated systems.
- Developing the image of a socially responsible company by being a part of sustainable development approach and the awareness of the need to expand the "societal" responsibility of the organization.
- Better knowledge and control of legal and regulatory requirements.
- Ensuring the company's sustainable competitiveness by creating value in a fair and responsible manner for the customer and for the main stakeholders.

### **3.2.2 Issues of IMS:**

The harmonization of the various management aspects faced with the issues importance is none other than the sustainable competitiveness which is necessary for the survival and the development of the company, we thus speak about:

➤ **Organizational issues:**

The IMS allows having a global vision on the operating mode of the organization by simplifying the systems management. Each employee is both an actor and a beneficiary of the process. This collaboration is reflected by the distribution of responsibilities, so everyone knows their role, what to do in a given situation and how they do it.

➤ **Regulatory issues:**

This involves compliance in terms of quality, health, safety and environment within the company's perimeter. Compliance and then respect of the regulations represent the preliminary conditions for the implementation of an integrated management system.

➤ **Financial issues:**

One of the objectives of the IMS is to minimize the cost of maintaining the management system by significantly reducing malfunctions through the implementation of preventive procedures upstream of the system.

➤ **Brand image issues (environment):**

The IMS allows companies to increase their environmental, social and financial performance through concrete actions. Thus, the integration of the concept of sustainable development allows the company to improve its brand image with its stakeholders (Goïnard, 2006).

### 3.3 The interested parties in IMS:

After seeing that the issues of the integrated management system consist, for an organization to satisfy all its interested parties. We will see in the following table the different interested parties in the IMS:

**Table 5:** The interested parties of IMS and their needs.

<b>The interested parties</b>	<b>Needs / Expectations</b>
<i>The customers:</i> it can be a customer who buys the product, the one who pays and/or the one who uses the product. Each of these customers has explicit and implicit expectations that need to be formalized in order to meet them.	Product that meets their expectations, and be informed of the risks of using it.
<i>The staff:</i> permanent employees of the company but also temporary employees (fixed-term contracts, trainees) and even visitors (suppliers, customers) and companies working within the establishments.	Guarantee of their job, and health and safety at work.  Contribution to QSE performances.
<i>The shareholders:</i> they generally tend to aim for maximum profitability of the invested capital (search for dividends or short-term capital gains). However, the profitability search must be constant, whether for quality, safety or the environment.	Sustainability and profitability of activities.
<i>The Insurers:</i> they intervene to cover the risks and the premiums which are all the more expensive as the risk is high.	Having confidence in the company's ability to manage its risks.
<i>The state:</i> The public authorities are responsible for enforcing the law. They are in general: the ministries and the directions of the environment, the industry, the agriculture, and the health.	Compliance with regulations.
<i>The general direction:</i> it focuses on the quality, safety and environmental performance of the organization.	Continuous improvement of the organization.

**Source:** Elaborated by our care.

### 3.4 Benefits and difficulties of IMS:

#### 3.4.1 Benefits:

If the implementation of the integrated management system has become a real necessity for organizations, it is because of the multiple advantages that this new system provides such as:

- Assurance of the coherence of the company's strategy in terms of quality, safety and environment;
- Avoidance of redundancies, especially in documentation,
- Optimization of resources; a single team of auditors, for example, to audit the integrated system at once rather than through 3 separate audits
- Facilitating the implementation of the various systems and training in their implementation;
- Assurance of the simultaneous consideration of quality, safety and environmental requirements for new products, processes, installations or new locations;
- Enhancement of the company's image;
- Reduction of the efforts reproduction and therefore of costs
- Improvement of the processes performance;
- Facilitating the appropriation of the system by the employees.
- Satisfaction of all interested parties;
- Anticipation of safety and environmental risks;
- Global reflection of the company on the Quality, Safety and Environment themes;
- Assurance of a permanent balance in the decision making process.

**Source:** (Bekhouche, 2018)

Besides, (Torregrosa, Bernabeu, Soler, & Guillem, 2017) noted from their studies carried out in Spanish firms other important benefits from IMS like:

- Task simplification (documentation, control, requirements)
- Increase of organizational efficiency (cost reduction, etc.)
- Better use of the internal and external audit results.
- Firm image improvements.
- Competitive advantage in the market.

### 3.4.2 Difficulties:

After having seen the benefits of the integrated management system, we will see what its difficulties are. According to (I Villar, 2012) who has cross referenced the work of Zeng and et al. (2007) that indicated the difficulties when organizations implement IMS. The difficulties of IMS are divided into two dimensions: Internal and external difficulties. As said, the internal dimension includes four subgroups, that is: strategic level, tactical level, operational level and human resources. As for the external dimension, the three subgroups are: institutional environment, stakeholder's involvement and certification as shown in Tables 6 and 7:

**Table 6:** Internal difficulties in IMS.

<b>Internal Difficulties</b>	<b>Description</b>	<b>Authors</b>
<b>Strategic (general, planning, objectives)</b>	<ul style="list-style-type: none"> <li>• Lack of strategic planning.</li> <li>• Difficulties in organising an IMS.</li> <li>• Risk of creating a ranking of systems by different areas of responsibility.</li> </ul>	<ul style="list-style-type: none"> <li>• Zutshi and Sohal, 2005; Asif et al. 2009.</li> <li>• Zeng et al., 2007; Salomone, 2008.</li> <li>• McDonald et al., 2003; Jorgensen et al., 2006; Salomone, 2008.</li> </ul>
<b>Tactical (processes and systems)</b>	<ul style="list-style-type: none"> <li>• The combination and effective integration of the different systems is not always clear.</li> <li>• Lack of resources.</li> <li>• Problems in the integration of the objectives, processes and resources in the MS.</li> <li>• Difficulties after the IMS implementation caused by ineffective design or implementation.</li> </ul>	<ul style="list-style-type: none"> <li>• Karapetrovic and Jonker, 2003; Griffith and Bhutto, 2009; Asif et al., 2010.</li> <li>• Asif et al. 2009.</li> <li>• Karapetrovic, 2002a.</li> <li>• Beckmerhagen et al., 2003.</li> <li>• Asif et al., 2009.</li> </ul>
<b>Operational (documentation, procedures)</b>	<ul style="list-style-type: none"> <li>• Increased bureaucracy.</li> <li>• Difficulties in preparing reports of the results of integration.</li> </ul>	<ul style="list-style-type: none"> <li>• Matias and Coelho, 2002; McDonald et al., 2003.</li> <li>• Zutshi and Sohal, 2005.</li> </ul>
<b>Human Resources</b>	<ul style="list-style-type: none"> <li>• Problems related to the organizational culture.</li> <li>• Lack of knowledge of the process, resulting in integration delays.</li> <li>• Inter-functional conflicts due to different interests and motivations.</li> <li>• People's attitudes and behaviour.</li> <li>• Loss of power by some roles in the hierarchy.</li> </ul>	<ul style="list-style-type: none"> <li>• Beckmerhagen et al., 2003.</li> <li>• Wilkinson and Dale, 2000; Zeng et al., 2007.</li> <li>• ; Zeng et al., 2007; Salomone, 2008.</li> <li>• Zutshi and Sohal, 2005; Zeng et al., 2007; Asif et al., 2009.</li> </ul>

**Source:** (I Villar, 2012)

**Table 7:** External difficulties in IMS.

<b>External Difficulties</b>	<b>Description</b>	<b>Authors</b>
<b>Institutional Environment</b>	<ul style="list-style-type: none"> <li>• Changes in regulations and guidelines.</li> <li>• Lack of government support.</li> </ul>	<ul style="list-style-type: none"> <li>• Zutshi and Sohal, 2005; Zeng et al., 2007.</li> <li>• Karapetrovic et al., 2006.</li> </ul>
<b>Stakeholders involvement</b>	<ul style="list-style-type: none"> <li>• Differing perceptions of who the main stakeholders are.</li> </ul>	<ul style="list-style-type: none"> <li>• Karapetrovic and Willborn, 1998a; Beckmerhagen et al., 2003; Zeng et al., 2007; Asif et al., 2009.</li> </ul>
<b>Certification</b>	<ul style="list-style-type: none"> <li>• Insufficient harmonisation of the standards from the ISO 9000 and ISO 14000 series.</li> <li>• MSSs are based on different models.</li> <li>• Lack of support from the certification bodies.</li> <li>• Differences in the scope of the systems.</li> <li>• Differences in the general elements of the standards and in their specific requirements.</li> <li>• Lack of experience, formation and use of consultants.</li> <li>• Existence of different methods for integration.</li> </ul>	<ul style="list-style-type: none"> <li>• Karapetrovic and Willborn, 1998a.</li> <li>• Karapetrovic, 2003; McDonald et al., 2003; Salomone, 2008.</li> <li>• Zeng et al., 2007; Salomone, 2008.</li> <li>• Karapetrovic and Willborn, 1998a; Wilkinson and Dale, 2000.</li> <li>• Matias and Coelho, 2002; Karapetrovic, 2002; Karapetrovic, 2003; Beckmerhagen et al., 2003.</li> <li>• Zutshi and Sohal, 2005.</li> <li>• Karapetrovic and Willborn, 1998a; Karapetrovic, 2002; Jorgensen et al., 2006.</li> </ul>

**Source:** (A. I Villar, 2012)

#### **4. Process of management systems integration:**

Integration can be defined as: *«a strategy that is part of the company's strategies, and a logical extension of the strategic objectives. It consists on a destruction of all technical, organizational and human barriers that hinder improvement and synergy in the company so that all activities are carried out in a productive and efficient way»* (Dakkak , Talbi, Chater, & Guennoun , 2013).

##### **4.1 Reasons for integration:**

Before talking about the principles and possibilities of integration, we will give the reasons why we should build a QSE strategy. There are several reasons:

- Gaining a competitive advantage and an image benefit.
- Achieving cost savings.
- Knowing and controlling nuisances and better managing risks.
- Implementation of a global action plan.

## **4.2 Forms of integration:**

The implementation of an integrated management system takes place in several phases:

- Harmonized systems with common and specific systems for each system.
- Nested systems with partially overlapping systems.
- The common system where the elements of management are treated in the same way
- The global system which applies to subsystems or to a set of activities.

## **4.3 Level of integration:**

In the case of an integrated system, the quality, safety and environment sub-systems may have common and specific distinct parts, and may even have identical elements, but all these parts must be coordinated or harmonized by implementing several levels of integration:

### **4.3.1 Integration at the top:**

In this case, the integration can be done at two levels, the policies as well as at the level of the QSE functions:

- a. Integration at the policy level:

It means either the quality, environment and safety policies are expressed in a single text, or we are dealing with several separate texts, but which all refer to another text of a higher order, which may be either the management's commitment or a company project.

- b. Integration at the level of the quality, environment and safety functions:

For there to be complete integration, there must be a common authority for Quality, Environment and Safety. However, it is possible to apply an integrated policy with three separate authorities for QSE.

### **4.3.2 Integration at the process and document system level :**

- a. Integration at the process level:

There are three processes: horizontal or support processes, Vertical processes and processes specific to quality, the environment and safety.

b. Integration at the level of the documentation system:

We can consider this integration by means of the image of the pyramid of documents; we can say that an integrated system supposes: either a common QSE manual that guides common procedures and other specific ones; or separate manuals that may depend on a common QSE manual or a more general management manual.

**4.3.3 Integration at the level of human resources:**

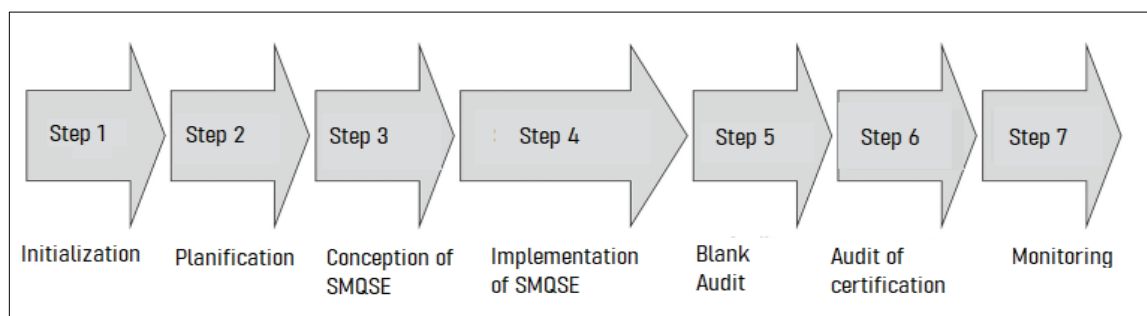
Integration means the mobilization of human resources during the implementation of the system, to describe the work processes themselves, the operating procedures and the instructions. The staff is made aware of the quality, safety and environmental requirements, as well as the similarities and differences between them, while seeking to improve the processes.

**4.4 The integration methodology:**

Like any project, the project of the implementation of an integrated management system within a company requires a methodological approach that includes different important phases such as: the preparation, the implementation, the audit to deal with non-conformities detected through continuous improvement actions which belong to the last phase monitoring. Furthermore, any organization can adapt its own method or model of integration which fits to its nature and specifications that is consistent with its policy, strategy and objectives (Moumen & Knouch, 2018).

Consequently, (Pinet, 2015) proposed a method called: The 7S which concerns the control of the IMS QSE certification project process. This process is divided into seven steps; each step contains a detailed process description with the list of tasks that compose it.

**Figure12:** The positioning of the 7 S method steps.



**Source:** Elaborated by our care

The corresponding processes are described below for each of the steps:

➤ **Step 1: Initialization of the project**

Specifying the objectives, analyzing the state of the organization based on the requirements of ISO 9001, ISO 14001 and ISO 45001 standards, mobilizing the means, designating the official project team and publishing the precise objectives.

➤ **Step 2: Project planning**

Foreseeing and scheduling the implementation activities, estimating the deadlines and defining the steering indicators whose purpose is to produce the project plan.

➤ **Step 3: conception of the QSEMS**

Demonstration how the organization meets the requirements of ISO 9001, ISO 14001 and ISO 45001 standards:

- Writing the IMS manual.
- Identification and formalization of processes related to quality, environment, health and safety at work.
- Drafting of procedures and operating modes.
- Structuring of the documentation classified in a tree structure and included in a life cycle.

➤ **Step 4: Implementation of the QSEMS**

Transition from theory to practice through the operational implementation of the standards requirements:

- Staff training.
- Application of processes and procedures.
- Measurement of indicators.
- Treatment of the measures recordings of the IMS behavior.

➤ **Step 5: The blank audit**

Submitting the organization to an audit of its MS under the same conditions as the certification audit and to verify that it is ready for the final examination:

- Decision via the steering committee to proceed with the internal audit.
- Planning of the internal audit
- Proceeding the document review
- Conducting interviews to identify gaps and potential dysfunctions.
- Achievement of a blank audit report.

➤ **Step 6: The certification audit**

The control examination by which an organization has its management system verified by an accredited third party according to the standards: ISO 9001, ISO 14001 and ISO 45001:

- Choosing an accredited certification body, negotiating and signing an audit contract.
- Planning and implementation of the audit in cooperation with the certification body which includes two main phases: the audit of the documentary system and the operational verification.
- Issuance of the initial ISO certificate by the certification body for a functional integrated management system. The certificate is valid for 3 years.

➤ **Step 7: Monitoring**

After obtaining the certification, a certain number of activities are to be carried out:

- Evolutions management and the continuation of control efforts.
- Conduct of management reviews
- Implementation of internal audits
- Conduct of continuous improvement which consists of the implementation, monitoring and control of the effectiveness of corrective or preventive actions included in an improvement plan.

## 5. The HLS structure:

### 5.1 Concepts:

HLS is the acronym of «*high-level structure*» which a universal structure for management standards that was adopted by the International Organization for Standardization (ISO, 2012).

The HLS provides identical structure, text and common terms and definitions for all future ISO MSSs. Now, all ISO's management systems standards could be aligned, facilitating full integration of several standards into one management system in a single organization (ISO, 2017) due to Annex SL-based Standards which share a similar structure of 10 clauses and makes it much easier to see the similarities and shared processes of each Standard (Price, 2021).

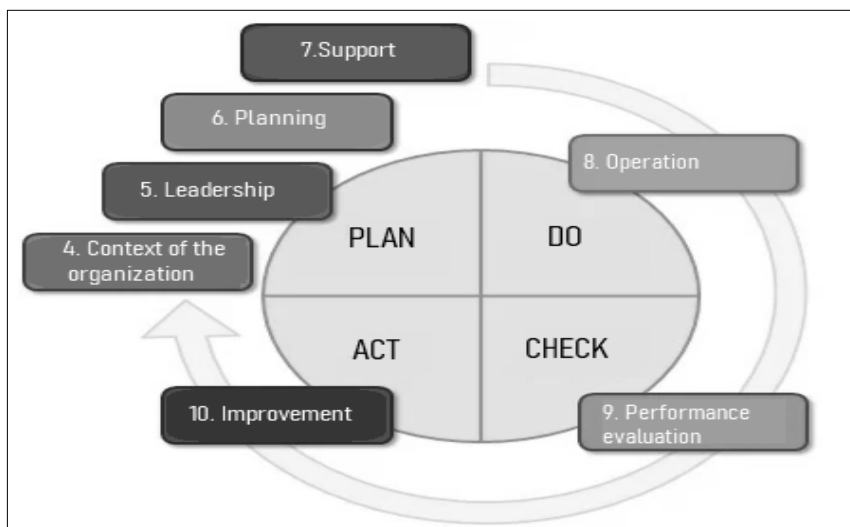
Annex SL is the high-level structure for modern ISO Standards. Through this new structure, the ISO wanted to ensure consistency and compatibility between the different Management System Standards. In turn, the structure allows for a more straightforward implementation when integrating multiple Standards and makes it easier for businesses and their staff to follow (Janion, 2019).

The Annex SL Clauses can be categorized as follow:

- 1) Scope
- 2) Normative references
- 3) Terms and definitions
- 4) Context of the organization
- 5) Leadership
- 6) Planning
- 7) Support
- 8) Operation
- 9) Performance evaluation
- 10) Improvement

The first three clauses are relatively general and do not contain any requirements but the following seven can be grouped according to the PDCA model (Figure 13).

**Figure 13:** Illustration of the PDCA in the HLS structure



**Source:** Elaborated by our care.

### 5.2 Objectives of HLS:

It pursues several objectives among which we distinguish the following ones:

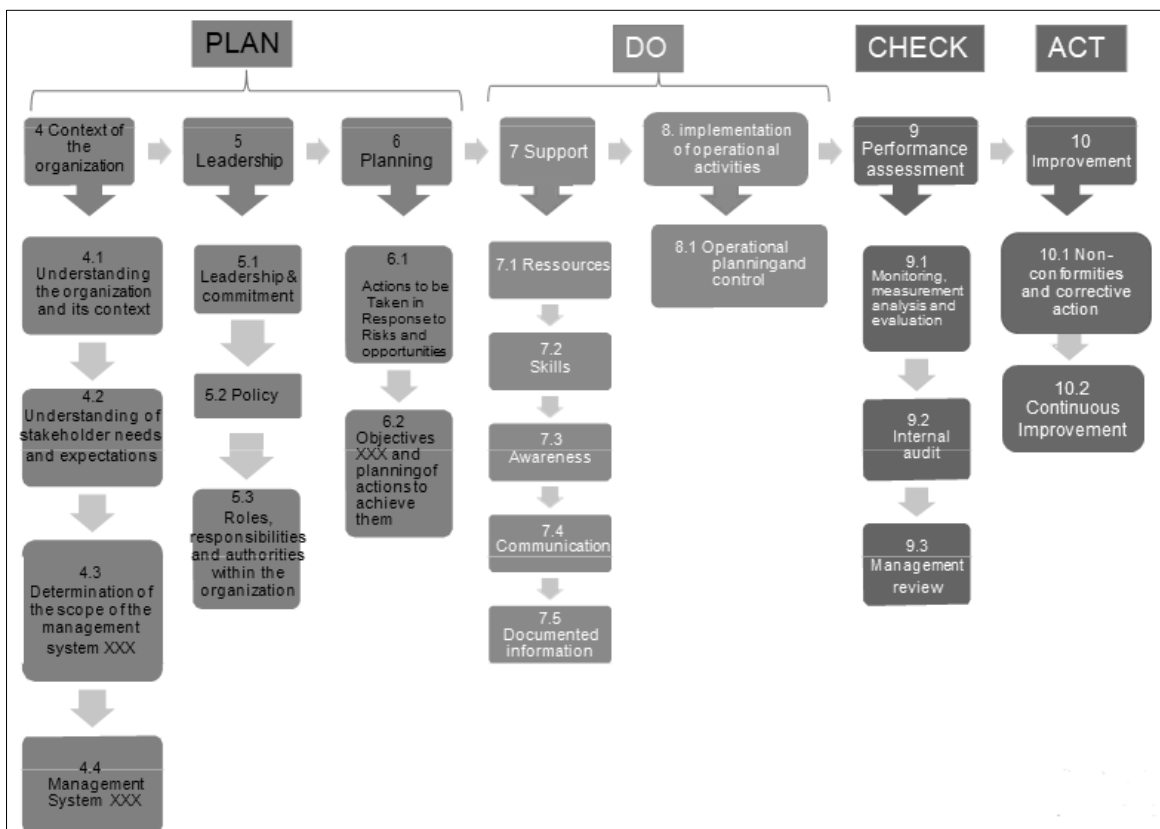
- Providing a common framework of coherent requirements, in order to facilitate their integration into the integrated management system.
- Reading ease of the requirements by structuring them according to the principle of continuous improvement.
- Changes reflection in complex, dynamic and highly demanding environments.
- Focusing on the effective management of processes to achieve the expected results.
- Facilitating the achievement of the sustainable development objectives.

### 5.3 Benefits of HLS:

According to Kabore and Ouedraogo (2020), the main concepts and benefits of the HLS structure can be listed as follows:

- Systematic approach to change management.
- Application of the risk-based approach.
- Increasing the sustainable performance of the organization by providing a comprehensive understanding of the business context and by identifying the stakeholders.
- Increased compatibility between standards.
- Increased efficiency of standards development for technical committees.

**Figure 14:** The HLS structure in management system standards



**Source:** Elaborated by our care (inspired by Chibani, 2021)

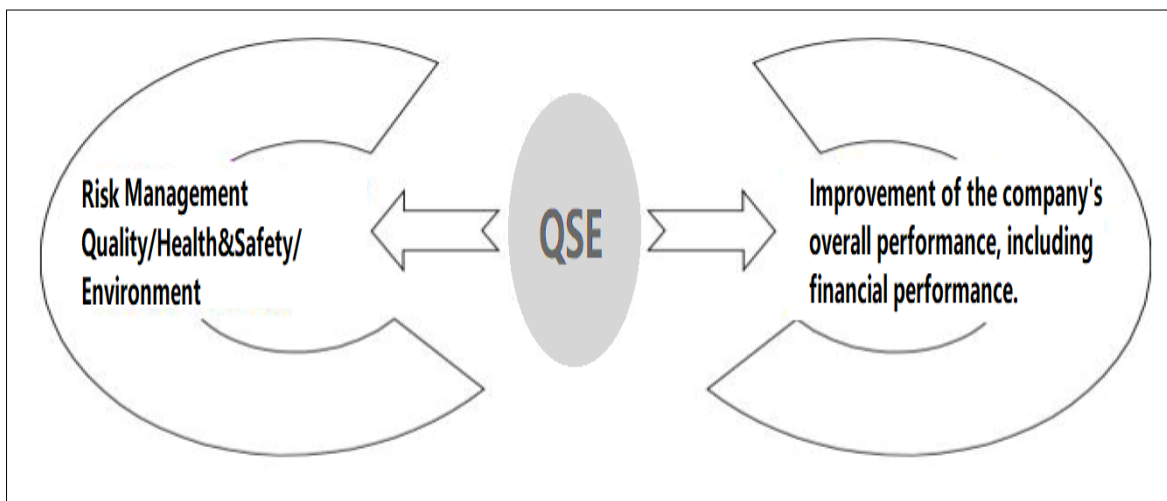
## 6. The integrated QSE management system and risk analysis:

A company that deploys an integrated QSE management system has a real risk management system, a coherent steering tool that strengthens its position in a very competitive market by enabling it to develop an image of a responsible company that knows the risks associated with its business and chooses to reduce them to a reasonable level. It limits the hazards of possible contradictions between the three systems and asserts its commitment by being transparent (FAUCHER, 2006). By implementing a risk management system, companies are better equipped to achieve their strategic objectives (Beasley et al., 2015).

Therefore, the integrated QSE management system has two fundamental sides:

- Risk management.
- Performance improvement.

**Figure 15:** The two fundamentals of QSE integrated management system



**Source:** Elaborated by our care

Over the last few decades, we have become accustomed to considering only the negative aspect of the uncertainty of the future, the threats, in a word the probability of losses generated by a random event, forgetting the possibility of gains which we call: opportunities.

By proactively managing multiple risks and taking advantage of these opportunities, risk management contributes to minimizing losses and achieving the company's performance and profitability objectives. It promotes effective reporting of financial and non-financial information and compliance with regulations, sparing the company from the adverse consequences of a loss of reputation (COSO, 2004).

### 6.1. Definitions:

- According to COSO (2004), the risk management is defined as a process implemented by the board of directors, the general management, the management and all employees of the organization. It is taken into account in the development of the strategy and in all the activities of the organization.
- The ISO 31000 standard provides principles and guidelines for risk management to identify, assess and mitigate the risks faced by organizations. It recommends that organizations develop, implement and continuously improve an organizational framework that aims to integrate risk management processes into the organization's governance, strategy and planning, management, reporting processes, policies, values and culture.
- However, The ISO 31000 Risk Management Guidelines has retained as a definition of risk: *«the impact of uncertainty on objectives»*.
- The risk can also be defined as the possibility of an event occurrence whose consequences could affect people, assets, the environment, and the organization's objectives (Daoud Ben Arab & Masmoudi, 2015).

A risk is generally expressed in terms of:

- **Sources of risk:** *«any element that, alone or in combination with others, is likely to generate a risk»*.
- **Event:** *«the occurrence or change of a particular set of circumstances»*.
- **Consequence:** *«the effect of an event on objectives»*.
- **Likelihood:** *«the possibility of something happening»*.

**Source:** (ISO 31000 Risk Management-Guidelines, 2018, p. 2).

### 6.2. Risk Management System benefits:

The ISO 31000:2018 risk management standard will allow any company to obtain the following benefits:

- Competitive advantage ;
- Reduction of costs due to a good risk management;
- Effective reaction to various changes and viable solutions found quickly;
- Value creation and protection;
- Increase in the probability that objectives will be achieved;

- Optimal identification of opportunities and threats;
- Identification and mitigation of risk throughout organization;
- Increased stakeholder buy-in and confidence;
- Decision-making and planning by creating a consistent foundation.

### 6.3.Risk Management System Principles:

The ISO 31000:2018 standard lists the following eight principles for any solid risk management program. Every part of this system is founded by these principles, from the framework to the processes as shown in Figure 16.

**Figure 16:** The 8 principles of Risk Management System



**Source:** (Luburić, 2019)

#### 6.4. The main tools used for the QSE analysis risks:

##### ➤ **Process risk analysis: Failure Modes, Effects and Criticality Analysis (FMECA):**

Among the quality tools and techniques for preventing potential problems, the FMECA method (AMDEC in French) is a simple and very effective method. It is the acronym for Failure Mode and Effects and Criticality Analysis. The main objective of this technique is to study, identify, prevent or at least reduce the risks of failure of a system, a process, a product or a service.

In fact, this technique provides a thorough knowledge of the functioning and interactions of any system through the systematic analysis of cause-effect, it allows to:

- Know the most important elements (functions and components);
- Discover, evaluate and classify the weaknesses, anomalies and malfunctions of the system;
- Manage the critical points and question even the system design;
- Recommend corrective actions;
- Evaluate the effects of these measures to ensure their effectiveness, and to compare and decide.

The achievement of a FMECA process involves the following 5 steps:

- **Step N°01:** The constitution of a multidisciplinary working group

A FMECA study is a group work, composed, depending on the case, of the pilot of the FMECA, a person who knows the method well and who will be the group leader, the operators and the process pilot studied, as well as a decision maker. The group is completed by people who bring an expertise or enlightenment on the subject.

- **Step N°02:** Prepare the study, the formalization of the process

Before embarking on the realization of the FMECA, the FMECA manager ensures that the group has all the elements to know precisely the process studied.

- **Step N°03:** Conducting the failure analysis

At this stage, we look for the different possible non-conformities at each stage of the process, as well as the consequences of these processes and the nonconformities on the following steps of the process. After that, the working team studies the possible causes of these failures (e.g.: the 5M method).

- **Step N°04:** Evaluation of these failures and determination of their criticality.

It is possible to rate and prioritize the potential non-conformities identified, taking into account their effects, their identified causes and the control system planned. This analysis will allow to identify the most critical steps of the process and to propose actions to remedy them.

The calculation of the criticality of each non-conformity is done by taking the product of the notes of gravity, probability of occurrence.

$$\text{Criticality} = \text{occurrence} \times \text{gravity}.$$

**Occurrence or probability of occurrence:** the frequency with which the failure is likely to occur again.

**Gravity:** it expresses the importance of the effect on the customer.

- **Step N°05:** Reduce the criticality of failures

From the data obtained, we determine the actions to implement in order to reduce the most important criticalities. We work in priority by acting on the potential causes to avoid the occurrence of the failure. If this is not possible or not sufficient, we act on the controls that will stop the failure. This may involve implementing technological or organizational changes to the process.

➤ **Environmental risk analysis: Environmental Analysis:**

Environmental analysis is therefore a thorough preliminary analysis of the company's environmental problems, impacts, performance and monitoring activities.

The environmental analysis can be carried out internally only or with the support of external assistance depending on the human and financial resources available in the company and according to the deadlines set, it must cover 4 aspects:

- The identification and analysis of environmental problems that could arise from the activities carried out on the site;
- Identification of operational practices and management procedures already in place;
- Identification of the history of environmental accidents and any resulting fines, penalties, prevention or control measures;
- Identification of and compliance with applicable legislative and regulatory requirements.

It is necessary for any organization to determine the environmental aspects that fall within the scope of its environmental management system. To do so, it considers the inputs and outputs associated with its current or relevant past activities, products and services; new or planned developments; and new or modified activities, products or new or modified activities, products or services. In determining its environmental aspects, the organization may consider:

- Emissions to air.
- Discharges to water and/or land.
- The use of raw materials and natural resources and energy.
- Waste and/or by-product generation.
- Use of space.

There is no single method for determining significant environmental aspects. However, the method and criteria used should provide consistent results. The organization should establish the criteria for determining its significant environmental aspects. These criteria can be related to the environmental aspect (frequency) or to the environmental impact (gravity).

These other criteria may include issues specific to the organization, such as legal requirements or the concerns of interested parties. (ISO 14001: 2015, Environmental management systems Requirements and guidance, p. 26).

➤ **Risks related to OHS Analysis: Occupational risks assessment:**

One of the fundamental elements of an occupational health and safety management system is the analysis of the risks specific to the company's activity and the implementation of the appropriate preventive measures to reduce them to an acceptable level (Goinard, 2006).

Occupational risk assessment is a method for estimating health risks from exposure to various levels of a workplace hazard. Understanding how much exposure to a hazard poses health risks to workers is important to appropriately eliminate, control, and reduce those risks. (<https://www.cdc.gov/>, accessed on May 26, 2022)

In fact, the identification of hazards inherent to a process or a workplace is a preliminary but crucial step in the risk analysis. A distinction must be made between the hazard, which is a source of damage, and the dangerous phenomenon as well as the dangerous event, which are the processes by which the damage occurs (Bernhard, 2007).

**Table 8:** Identification of occupational risks approach

<b>Prepare</b>
Preparation of the evaluation Informing and involving journeymen Define the work units activities and trades Choosing a work unit where we should start doing the risk assessment.
<b>Evaluate</b>
Identify dangerous situations To what dangers are the companions exposed? Under what circumstances? Assess the level of risk Number of employees concerned, frequency and severity.
<b>Solve</b>
Analyze dangerous situations identify the origin of the situations Search for possible solutions Choose the solutions that will be implemented in the company
<b>Act</b>
Implementing actions Evaluate the effectiveness of the selected solutions

**Source:** Elaborated by our care

**CHAPTER II:**  
**METHODOLOGICAL**  
**FRAMEWORK &**  
**ORGANIZATIONAL CONTEXT.**

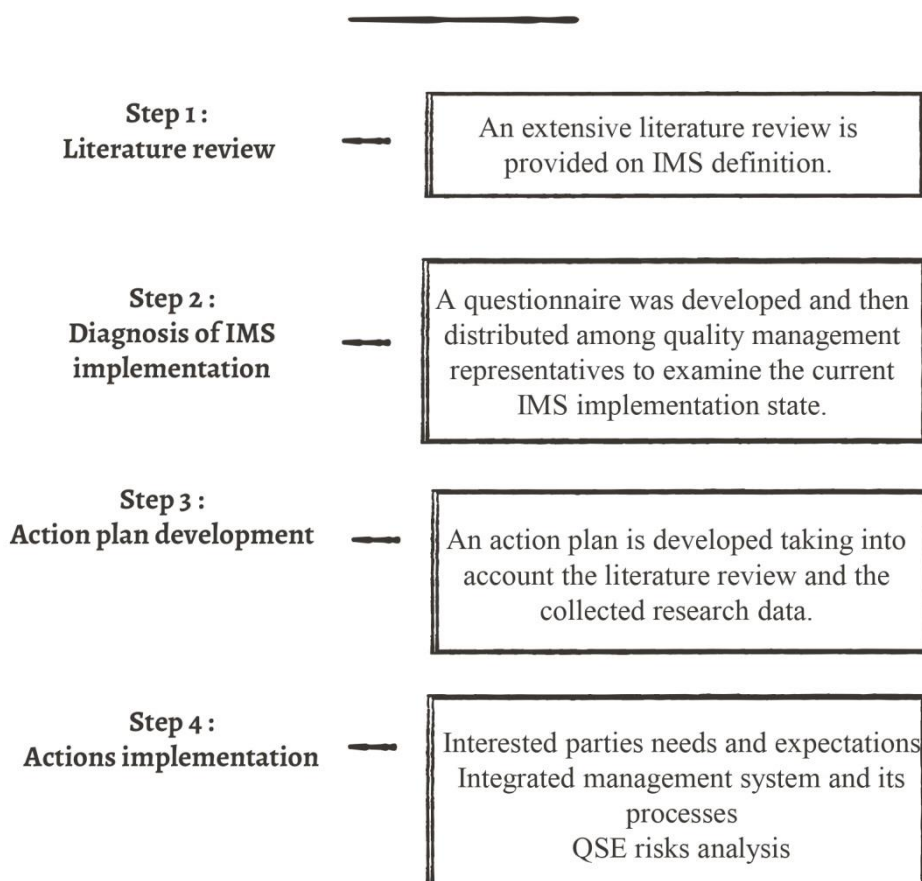
## Section one: Research Methodology

In this section we will deal with the used research methodology to carry out this work. This study uses *qualitative research* method which can be defined as « *the study of the nature of phenomena* » (Philipsen and Dassen, 2007) with the purpose of getting an overview of the implementation of the integrated management system (IMS) in accordance with the *ISO 9001:2015*, *ISO 14001: 2015* and *ISO 45001: 2018* within the Algerian company of AMENHYD spa. Our study is based on a qualitative data collection which is obtained due to four essential tools (Table 9).

### 1. Research method:

In order to achieve the research objectives, the IMS implementation approach used in this work is described as follows in Figure 17.

**Figure 17 :** The IMS implementation approach



**Source:** Elaborated by our care.

## 2. Data Collection

The most commonly used data collection methods are document study, participant observations, semi-structured interviews and focus group discussions (Busetto, Wick and Gumbinger, 2020; Moser and Korstjens, 2017 ) which were collected at different stages of the IMS implementation process.

**Table 9:** The data collection tools

Adopted data collection tools	Description
Document study	<p>Document study refers to the review by the researcher of written materials. These can include personal and non-personal documents such as archives, annual reports, guidelines, policy documents, diaries or letters.</p> <p>In our internship, we have examined the website of the studied company, and on the other hand the internal documents which are considered an important source of reliable information.</p>
Participant observation	<p>Observations are particularly useful to gain insights into a certain setting and actual behavior as opposed to reported behavior or opinions.</p> <p>Qualitative observations can be either participant or non-participant in nature.</p>
Interviews	<p>Hijmans &amp; Kuyper describe qualitative interviews as “<i>an exchange with an informal character, a conversation with a goal</i>”. Interviews are used to gain insights into a person’s subjective experiences, opinions and motivations as opposed to facts or behaviors.</p> <p>Whatever its form (directive, semi-directive, non-directive), the face-to-face interview is one of the richest and most flexible data collection techniques available. The interview guide was the first step in our work which contains questions about the integrated management system (Annex 6).</p>
Focus groups	<p>Focus groups are group interviews to explore participants’ expertise and experiences, including explorations of how and why people behave in certain ways.</p>

**Source:** elaborated by our care

### 3. Research Sample:

Sample selection is essentially a matter of choosing the right people or documents to answer our research question (Mongeau, 2009).

Throughout this research work, we interviewed managers directly or indirectly involved in the implementation of integrated management system within the AMENHYD's company, which allowed us to see the practices they have implemented in the company and to provide reliable information.

**Table 10:** the interviewed actors

<b>N°:</b>	<b>Name of the interviewee</b>	<b>Function</b>	<b>Gender</b>	<b>Date</b>	<b>Duration of the interview</b>
<b>01</b>	Mr. S. Hammoudi	QHSE Director	M	March-April 2022	3hours
<b>02</b>	Mr. F. Mahreche	Quality Manager	M	March-April 2022	5hours
<b>03</b>	Mr. T. Azzi	HSE Director	M	May 2022	90min
<b>04</b>	Mr. A. Boubrass	HSE Coordinator	M	May 2022	2hours

**Source:** Elaborated by our care

## Section two: Organizational Context

### 1. Presentation of the company AMENHYD:


#### 1.1 History and strategy of the company AMENHYD:

Activating in the sector of the BTPH, AMENHYD -the mother company- was created in 1994, under the name « ETB/TCE CHELGHOUM Djamel Eddine » in charge of realizing works of building and public works. It is by associating in 2003, with other companies to contribute to the satisfaction of the needs of the Algerian market, in particular in the activities « Development », « Hydraulic » and « Environment », that the Group was created. Currently, after completing its process of statutory incorporation, Amenhyd has become a Group in the legal sense of the term, called «Amenhyd Group».

AMENHYD is a private company under Algerian law which is a leader in the field of environment for 25 years, designs and implements tailor-made solutions for:

- Water storage, treatment and transport.
- Sorting and recovery of household waste.
- The treatment of industrial pollutants.
- Civil and industrial construction in prefabricated reinforced concrete,
- Civil and industrial deconstruction (dismantling, demolition and asbestos removal).
- The manufacture of process and mechanical equipment.

**Table 11:** AMENHYD's identity card

Full name of the company :	Company for the study and construction of hydraulic structures and environmental development works. 
Abbreviated Name:	AMENHYD Spa
Head office :	Boushaki F City N°28 Bab Ezzouar – Algiers - Algeria.
Mission :	Enhancing water resources and protecting the environment through reliable, innovative and digital solutions.
Principal Activities:	Design and Engineering, Procurement, Construction and Service.
Human ressources :	Its average workforce is 2,600 employees, including more than 650 managers and supervisors, with an average age of 41 years.
Email:	amenhyd@amenhyd.com
Tel :	+ 213 23 83 21 22
Site web:	<a href="http://www.amenhyd.com">www.amenhyd.com</a>

**Source:** Elaborated by our care.

### 1.2 Main Customers:

The main customers of AMENHYD are the Ministries of Hydraulics, Environment, the National Agency for Dams, water management companies, companies operating in the hydrocarbon sector, ONID, ONA, etc.

### 1.3 AMENHYD's Activities:

**Table 12:** The main activities of AMENHYD

<i>Activities</i>	<i>Projects</i>	
a) Water Treatment : Amenhyd has had to carry out more than a dozen treatment plants, demineralization and purification, by physical-chemical, biological and membrane processes (UF, NF, RO) (Figure 1).	Realized/ ongoing projects	Capacities
	<ul style="list-style-type: none"> <li>• STE Tichy Haf (Figure 2)</li> <li>• STE Ouled Badis, Setif</li> <li>• STE Hamadi Krouma, Skikda</li> <li>• STE Oued El Athmania, Mila</li> <li>• STE Akbou, Bejaia</li> </ul>	40 000 m <sup>3</sup> /j 8 000 m <sup>3</sup> /j 75 000 m <sup>3</sup> /j 50 000 m <sup>3</sup> /j 100 000 m <sup>3</sup> /j
b) Water transfer via pipeline : Over 800 km of steel pipes from 08 to 80 Two welding processes: Automatic & manual.	Realized/ ongoing projects	Length (km)
	<ul style="list-style-type: none"> <li>• AEP teldite – Bouira East</li> <li>• AEP Dziuou – Ain timouchent</li> <li>• AEP Cap djenet – Boumerdes &amp; Tizi ouzou North</li> <li>• AEP Mahouane -Setif</li> </ul>	120 40 115 95
c) Sorting of household and similar waste : Amenhyd has initiated this activity in Algeria and it is working to develop it allowing the creation of new industrial fields.	Realized/ ongoing projects	
	Closure and Rehabilitation of Ouled Fayet CET, Algiers (Figure 3). Rehabilitation of the Matrouha public dump, Taref. Rehabilitation of the Ain Guesma public dump, Tiaret. Decontamination Composting station Beni Mered, Blida.	

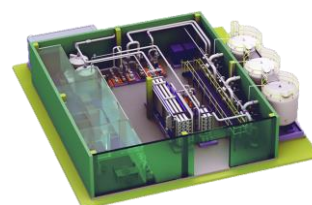
**Figure 18:** The main activities of the water treatment



Wastewater treatment



Water desalination and demineralization of brackish water and potabilization



Industrial water treatment

**Source:** Elaborated by our care

**Figure 19:** Reference Project: Water Potabilization Station of Tichy Haf Dam

Customer : Algérienne des eaux, Algeria

Capacity : 60 000 m<sup>3</sup>/d

Technology used :

- ✓ Aeration
- ✓ Coagulation-flocculation
- ✓ Decantation
- ✓ Sand Filters
- ✓ Ultra Filtration
- ✓ Nano filtration
- ✓ Injection of concentrates in an irrigation pipe

Commissioning: 2020



**Source:** Elaborated by our care

**Figure 20:** Reference project: Closure and rehabilitation of the Ouled Fayet CET site – Algiers.

Added value:

The eradication of the risks of water pollution (groundwater,...) by infiltration in the ground. Treatment of juices from waste (leachate) which are toxic for the environment by making them clean for discharge into the natural environment.



**Source:** Elaborated by our care.

## **2. AMENHYD's Structure:**

Even though the Activities are clearly distinguished by their missions, such as:

- Budget and Management Control Department;
- Quality, Health, Safety and Environment Department (Annex 2)
- Computer Systems Department;
- Human Resources Department

They are sometimes grouped together in the same structures. Each of them has both managerial and operational missions. This is the case of:

- Finance & Accounting Department;
- Procurement Department;
- Technical and Commercial Department;
- Research and Engineering Department;
- Equipment and Material Management Department;
- Method and Management of Civil Engineering Equipment Department;
- Engineering & Electromechanical Manufacturing Department;
- Investment and Infrastructure Realization Department.

The organization chart of AMENHYD's company is shown in (Annex 1).

**CHAPTER III:**  
**RESULTS & DISCUSSION**

## **Section one: Diagnosis of AMENHYD's company**

### **1. Diagnosis of the existing situation:**

After having taken a general idea on the functioning and the various fields of activities within AMENHYD's company. The next step in the implementation of an integrated management system is to get to know the system that prevails in the organization. The initial diagnosis aims to make the analysis of the state of an organization in order to identify its strong points and its insufficiencies.

As a trainee for a project to implement an IMS, we started with a study of the existing QMS documentary system within the host organization (Annex 3).

We were also recommended to make a site visit (equipment manufacturing construction site in Boudouaou and HSE department) to take notes using interview guides (the questions won't be asked in the same way as they are written in the guide, the main thing is to be able to easily collect the right answers appropriately to the existing state). This was the opportunity to ask our questions and also to get to know more about:

- The workstations, the situations on site;
- The identification and evaluation of occupational risks & environmental aspects and impacts in different processes of the company.
- Knowledge of the status of work accidents (if they exist);
- The state of play concerning the wearing of PPE;
- The level of awareness of the staff;
- Environmental controls

## **2. Strategic analysis:**

The strategic diagnosis is one of the most important steps in the implementation of any management system. It can concern the organization as a whole or some of its processes.

For this purpose, the AMENHYD steering committee carried out a diagnosis of the context in order to determine the relevant issues with regard to its strategic orientations as well as to identify its strengths and its insufficiencies according to the requirements of *ISO 9001:2015* standard.

### **2.1. Internal and external diagnosis:**

The strategic analysis includes the internal diagnosis which allows analyzing the resources and the competences of the company (study of the strengths and the weaknesses) and the external diagnosis which concerns the analysis of the environment of the company (study of the macro-economic environment). To obtain a synthesis of the strategic analysis by providing an overall vision of the company's global environment, the SWOT is the basic tool of this analysis. It summarizes the strengths and weaknesses of the company, as well as the opportunities and threats it faces as shown in Table 13 and 14.

**Table 13:** External Analysis of AMENHYD

N°	Issues	Type of external issue PESTEL	SWOT	Modification	Level of control
01	National preference (under Algerian law)	<b>Policy</b>	O	Unchanged	*
02	Willingness of public authorities to promote national subcontracting		O	Unchanged	*
03	Opening of the field of intervention to the private sector in the field of the delegation of the public service		O	Unchanged	*
04	Load plan in treatment stations	<b>Economic</b>	O	Unchanged	*
05	Lack of a clear medium and long term vision		T	The economic situation of the country, which is dependent on the hydrocarbon market, remains characterized by an unclear vision	**
06	Data collection on polluting industries		O	Unchanged	*
07	Unavailability of the spare part (DGL)		T	Diversification of partners and spare parts suppliers to moderate dependency	**
08	Availability and attraction of new trainees and graduates	<b>Social</b>	O	Unchanged	*
09	Difficulty in recruiting qualified personnel with the requirement of local recruitment.		T	Unchanged	**
10	Weak local competition in the mastery of the water treatment process with internal skills	<b>Technological</b>	O	Unchanged	*
11	Unavailability of process equipment suppliers		T	Launch of a long-term action plan for the manufacture of equipment related to the needs of the projects to face this threat.	**
12	Companies in the Oil & Gas sector are very demanding in terms of environmental and OHS compliance.	<b>Environmental</b>	O	Improvement of the HSE management system to move towards an integrated system (IMS QSE).	*
13	Lack of access to projects for concrete mixers at city level.	<b>Legal</b>	T	Unchanged	**
14	Change in the laws governing the import of goods and services		T	longer delay for importers which implies to launch the orders early	**
15	Percentage of the wage bill dedicated to continuing education and training.		O	Unchanged	*
16	Professional integration support system.		O	Device maintained by the state (new recruits with lower charges)	*

**Source:** Internal Document (company context 2021)

**Table 14:** Internal Analysis of AMENHYD

N°	Issues	Type of internal issues	SWOT	Modification	Level of control
01	Average involvement of the internal committee members of reading and validation of offers	<b>Intern</b>	W <sup>1</sup>	Digitization of offer validation activities	* *
02	Internally continuous application development		S <sup>2</sup>	Unchanged	* <sup>3</sup>
03	Control of technical and material means		S	Unchanged	*
04	Increase in the average payment time for external service providers		W	Unchanged	* <sup>4</sup> *
05	Control of absenteeism		S	The absenteeism rate is under control	*
06	process control ( <b>waste treatment</b> )		S	Consolidation of this issue by strengthening the workforce in terms of process control	*
07	Mastery of project management ( <b>work and industrial installation</b> )		S	Unchanged	*
08	Perpetuating and preserving the company's equipment and materials		W	Reinforcing preventive maintenance to preserve the equipment	* **
09	Qualified staff ( <b>Skills</b> )		S	Unchanged	*
10	Turnover control		W	Turnover is important at projects level	* ** <sup>5</sup>
11	Work accidents penalizing the company		W	The awareness actions carried out have generated a significant reduction in work accidents	*

**Source:** Internal Document (company context 2021)

<sup>1</sup> **W:** Weakness

<sup>2</sup> **S:** Strength

<sup>3</sup> \*: Acceptable level

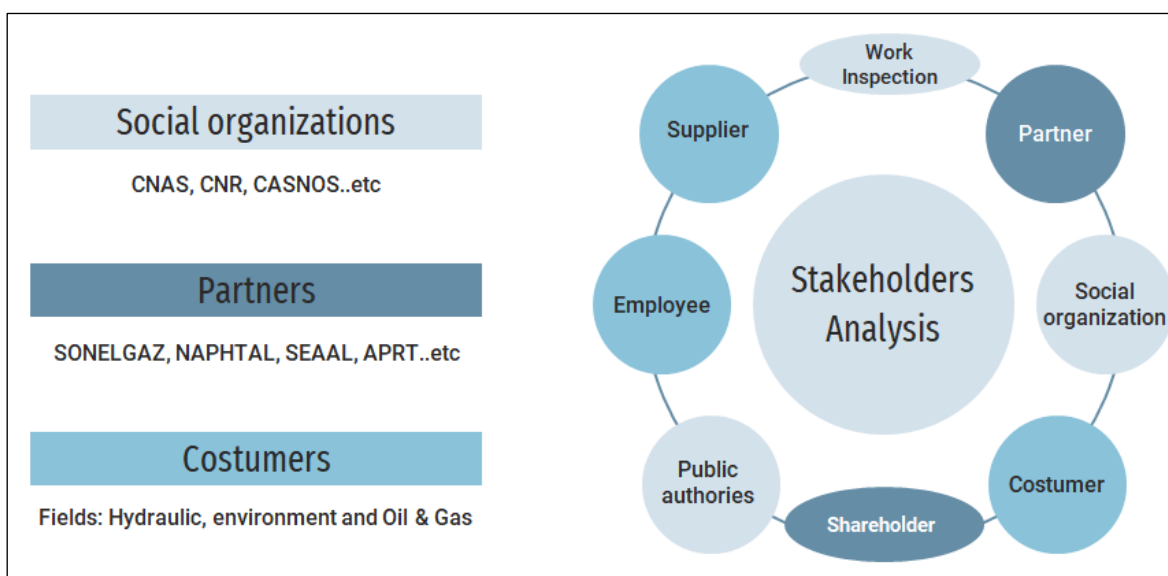
<sup>4</sup> \*\*: Moderately acceptable level

<sup>5</sup> \*\*\*: Unacceptable level

## 2.2.Stakeholders Analysis:

The “*stakeholders*” are all the concerned people by the functioning of the company (staff, customers, interested parties, etc.). The objective is that all the company actions must be apprehended by seeking to satisfy these actors. After conducting focus groups and having access to adequate documentation, a comprehensive list of AMENHYD stakeholders has been identified as shown in Figure 21.

**Figure 21:** Relevant stakeholders of AMENHYD



**Source:** Elaborated by our care

### QSE diagnosis according to ISO 9001, ISO14001 and ISO 45001 standards:

In order to allow AMENHYD to follow the evolution of its activities and its competitive environment, it was decided to go towards the certification of health and safety management at work according to *ISO 45001:2018* and environmental management according to *ISO 14001: 2015* by carrying out QSE diagnosis of the following chapters : 04 “Organizational Context”, 05 “Leadership”, 6 “Planning” and 7 “Support” of the three previous standards. The objective was to see what has been done compared to what should be done according to the requirements of the ISO 14001 & ISO 45001 standards in order to:

- Establish the gaps according to the regulations, requirements and good practices
- Identify and implement priority actions
- Make an inventory of existing practices and results

- Establish an action plan to contribute to the implementation of an Integrated Management System for its certification *ISO 9001: 2015, ISO14001: 2015* and *ISO 45001: 2018*.

The diagnosis was focused on the *ISO 14001* and *ISO 45001* after conducting face-to-face and online work sessions with QHSE department and collecting their responses, as the quality management system has already been reviewed and the results were satisfied in terms of compliance with the requirements of the *ISO 9001* standard. The overall diagnosis results are summarized in the table below:

**Table 15:** Overall results of the QSE diagnosis

Chapters	ISO 14001	ISO 45001	ISO 9001
	Compliance level		
4. Organizational Context	56%	56%	100%
5. Leadership	75%	75%	100%
6. Planning	50%	25%	100%
7. Support	78%	77%	87%
<b>System compliance</b>	<b>64,7%</b>	<b>58%</b>	<b>96,7%</b>

**Source:** Elaborated by our care

The rest of the diagnosis obtained results are shown in Annex 4.

## **Section two: Project of the implementation of an Integrated Management System QSE**

### **1. Planning of the IMS QSE project:**

The AMENHYD as a private company with industrial and commercial character and positioned on a competitive market, is in the obligation to engage in innovative approaches in order to keep its competitive advantage in a sustainable way.

In this context and taking into account the evolution of the environment in which it evolves, AMENHYD has launched a project of strategic importance which consists on the implementation of an integrated management system IMS, aiming at the three components: Quality, Health & Safety and Environment (QSE), according to the following standards:

- ISO 9001: 2015 : Quality Management System
- ISO 14001: 2015 : Environmental Management System
- ISO 45001:2018 : Health & Safety at work Management System

The planning is a pre-project phase. It consists in determining the course of the various activities throughout the period allocated to the work. Establishing a provisional schedule for the internship assignment is an important step in order to carry out the project.

For this reason and based on the auto diagnosis results, we've established an action plan in order to address the gaps identified in chapters 04 "Organizational Context", 05 "Leadership" and 6 "Planning" during a 6-week training period. This action plan is presented in a table, allowing visualizing the different actions taken (Annex 5).

## 2. Process of setting up the IMS within AMENHYD:

### 2.1. Understanding the needs and expectations of relevant stakeholders:

Basically, all projects depend on selecting stakeholders with whom they can jointly work towards their goals. For this reason, by the collaboration of different members of the company we've updated the list of the key stakeholders of AMENHYD, their needs and expectation, their interests as well as assessing the power of influence upon each stakeholder as mentioned in the table below:

**Table 16:** Updated list of relevant stakeholders

Stakeholders	Their needs/expectations	Interest <sup>6</sup>	Power (influence)
Public authorities	Compliance with legal and regulatory labor requirements, Contribution to national and local wealth	+++	+++
Hydraulic customer (ADE)	Compliance with contractual provisions Product/service compliance Permanent listening Reactivity Sharing of know-how Availability for emergency work Compliance needs call for tenders	+++	+++
Environment customer	Sensitivity to environmental regulations	+++	+++
Oil & Gas Customer	Increased HSE requirements Equipment compliance Authorization / personal approval	+++	+++
Direction of Environment	Contributing to the preservation of the environment Communication of environmental data Declaration of waste generated Compliance with regulations	+++	+++
Laboratory	Compliance with the clauses of the agreement	++	+++
The technical control organism	Compliance with payment terms	++	+++
The contractor	Compliance with contract and protocol of understanding clauses Clarification of roles and authorities	+++	+++
Staff	Training Career development Social climate	+++	+++
Shareholders	Sustainability of the company Growth in turnover, dividends	+++	+++
Subsidiaries	Complementarity	++	+

<sup>6</sup> 1 (+): low relevance, 2 (++) : strong relevance, 3 (+++): very strong relevance

QHSE certification organisms	Compliance with standard requirements Preservation of the health and safety of workers and the environment Applying management's commitments (QHSE policy)	+++	++
Central concrete customer	Service and product compliance Delivery and installation	+++	+++
Subcontractor/suppliers	Specifications including final customer specifications Payment terms Compliance with contractual provisions Feedback satisfaction measurement	+++	++
Ministry of Health	Preserve the health and safety of workers. Comply with legal and regulatory requirements in OHS requirements.	+++	+++
Financial institution	Compliance financing file Guarantees, financial statement, projections, investment plan.	+++	+++
Work inspection	Ensuring the health and safety of employees Compliance with regulations File compliance	+++	+++
Taxes	Compliance with regulations File compliance	++	+++
CNAS, MT		+	+++
CACOBATPH		++	++
OPREBATPH		+++	+++
CASNOS		++	+++
APRT, SONELGAZ, NAPHTAL, SEAAL, PTT	Compliance with application for authorization	+++	+++
ANEM	Job creation Compliance with regulations	++	++
Ministry of Commerce Ministry of Industry	Compliance with the regulations.	+++	++
Competitors	Compliance with commercial rules Professionalism	+	+
Consulting office	Compliance with contractual provisions Product/service compliance Permanent listening Reactivity	+++	+++
Civil protection	Ensuring industrial safety and regulatory compliance Regular communication to ensure awareness and the realization of simulations	++	+++

**Source:** Elaborated by our care

## **2.2.The Process Mapping project:**

Process mapping is a key improvement tool used to visualize how the company and its complex processes are delivered. It is used for determining the step by step flow of the process, its timing, handoffs, and identifying outputs that can be visualized, measured, and studied.

On the scale of AMENHYD, the identified processes have been classified into 3 main families as follows:

- **Management:** It contributes to the determination of the strategy, the policy and the deployment of the objectives while ensuring its continuous improvement in AMENHYD:

**QHSE Management process:** Ensure the proper deployment of the IMS policy and the provision of resources within all AMENHYD Spa structures and promote compliance with the provisions within the activities of AMENHYD in terms of health, safety at work and environment.

- **Realization:** It contributes directly to the realization of the product or service, from the detection of the customer's need to its satisfaction:

**Commercial process:** Describe the implemented measures to meet the needs of acquisition and diversification of the company's load plan in compliance with customer requirements.

**Works process:** Describe the implemented measures for the realization of products / sites in compliance with regulatory requirements, customer, product and IMS.

**Equipment manufacturing process:** Satisfy the manufacturing needs for equipment or their components according to the quality and deadlines defined, in accordance with the standards.

**Engineering process:** Describe the arrangements for study activities and their follow-up, including planning, designation, verification, review and validation.

**Administration & Market Management process:** The elaboration and the administrative and financial management of the contracts with customers (invoices, amendments, deadlines, etc.)

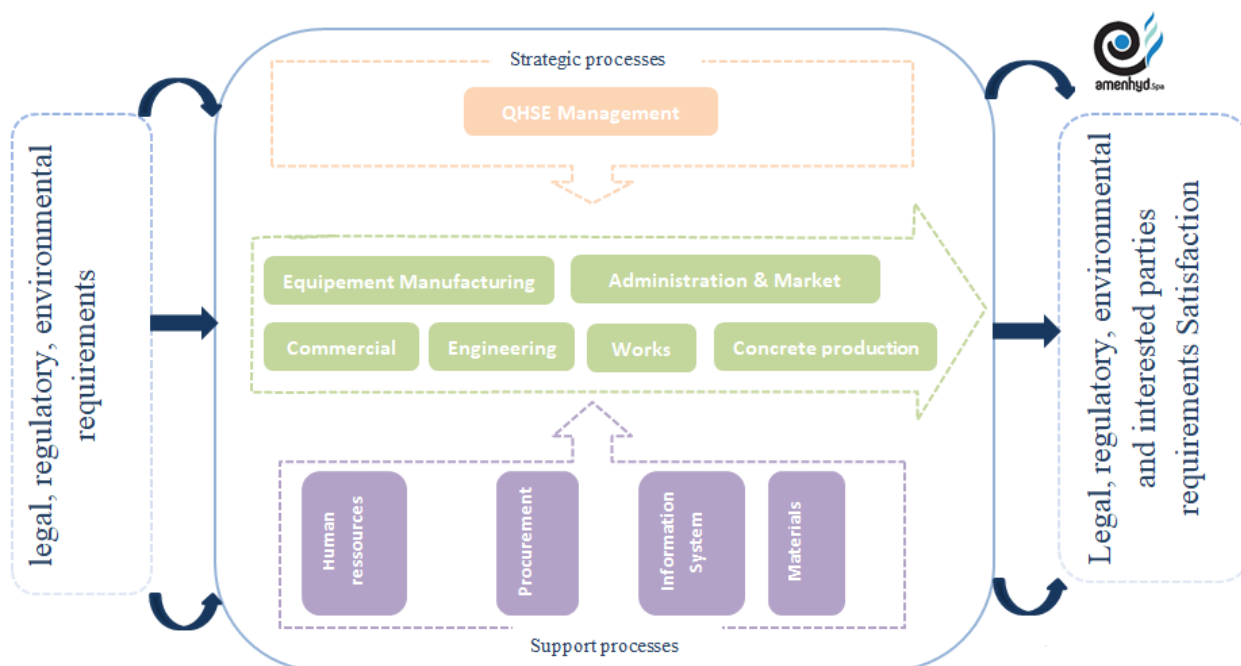
- **Support:** It contributes to the smooth running of the other processes by providing them with the necessary resources:

**Procurement process:** Ensure the preservation of the products in the warehouses and storage areas and the provision of the supply and raw material in accordance with the specifications in terms of the required quality, in the delivery times, in the quantities requested and at the lowest cost.

**Human Resources process:** Assist and advise the general management, central structures and projects in all legal and litigation matters.


These processes are visualized in a process map that we've suggested and represented in the figure 22.

**Figure 22:** The updated process mapping of AMENHYD's company




**Source:** Elaborated by our care


For the elaboration of the process sheets we have chosen only one process for each family of processes, as they are represented below:

	Process Sheet <b>QHSE Management</b>		Version
<b>Process Code: MP1</b>			<b>V0</b>
<b>Process purpose</b>	Ensure the management, control and optimization of the integrated management system. Improve the performance of the integrated management system and processes.		
<b>Inputs</b>	<b>Activities</b>	<b>Outputs</b>	
Regulatory monitoring report; process review plan; technological, normative and competitive monitoring report; work incident reports; results of customer satisfaction surveys; information on the functioning of processes from other departments	<ul style="list-style-type: none"> <li>- Ensure the implementation of the IMS policy and the application of all normative requirements</li> <li>- Identify any changes to the IMS and plan its implementation</li> <li>- Control documents and records of SMI</li> <li>- Plan process activities and define process interactions and determine resources</li> <li>- Monitor and measure the performance of IMS processes</li> <li>- Implementation of performance improvement actions</li> <li>- Dealing with non-conformities and ensuring the implementation of performance improvement actions</li> <li>- Prepare management reviews and write reports</li> </ul>	Customer and stakeholder satisfaction assessment; Audit reports; Communication plan; Process review reports; Internal audit programs and plans; Process scorecard; Process non-conformance sheets; Change sheets; Management review report	
<b>Process Pilot</b>	<b>Resources</b>	<b>Applicable reference documents</b>	
QHSE Manager	Human; Material; Financial.	Standards : ISO : 9001 :2015 , ISO : 14001 : 2015, ISO : 45001 : 2018	
<b>Indicators</b>	<b>Calculation method</b>	<b>Measurement frequency</b>	
Rate of controlled risks for each IMS process	Risks controlled / Risks detected	Semi-annual	
Rate of achievement of QHSE objectives	QHSE objectives achieved / QHSE objectives planned	Annual	

**Table 17:** QHSE Management Process Sheet (Elaborated by our care)

		Process Sheet <b>Equipment Manufacturing</b>		Version
<b>Process Code: RP1</b>				<b>V0</b>
<b>Process Purpose</b>		Manufacture and satisfy the ordered equipment by our customers according to the quality and quantity defined in the deadlines.		
<b>Inputs</b>	<b>Activities</b>	<b>Outputs</b>		
design file; manufacturing specifications; subcontracting contract; quality control plan; certificate of conformity; risk management action plan (Comprehensive risk assessment inventory); National regulation relative to environmental protection.	<ul style="list-style-type: none"> <li>- Receive the design file and the manufacturing specifications</li> <li>- Establish the quality control plan</li> <li>- Establish the production schedule and validate the resource requirements</li> <li>- Manage the state of the machines</li> <li>- Establish the control tests</li> <li>- Stock and identify equipment</li> <li>- Notify and organize the reception of the equipment</li> <li>- Release product for shipment</li> <li>- Establish a synthesis of the manufacturing file</li> </ul>	Final product; receipt register; consultation sheet; QHSE report; material requirement schedule; compliance sheet; consumption report; design modification request ;		
<b>Process Pilot</b>	<b>Resources</b>	<b>Applicable reference documents</b>		
Boudouaou unit Manager	Human (qualified personnel); Material (production and control, computer equipment, software, means of communication and Intranet); Financial.	Standards : ISO : 9001 :2015 , ISO : 14001 : 2015, ISO : 45001 : 2018		
<b>Indicators</b>	<b>Calculation method</b>	<b>Measurement frequency</b>		
Profitability Rate :	Allocated expenses/Realized expenses	Semi-annual		
Budget realization Rate :	Achieved turnover/expected turnover	Semi-annual		

**Table 18:** Equipment Manufacturing Process Sheet (Elaborated by our care)

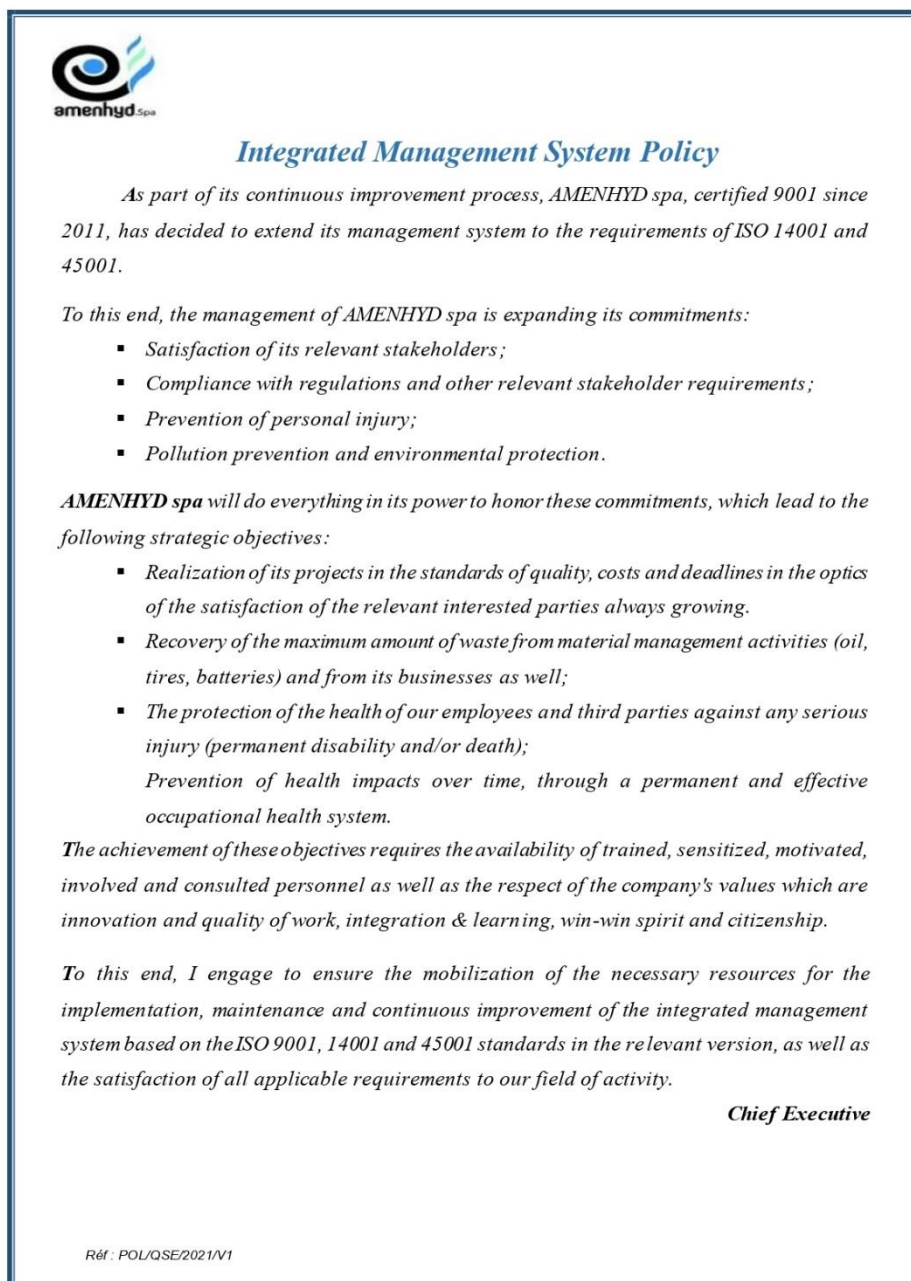
		Process Sheet <b>Human Resources</b>		Version
<b>Process Code : SP1</b>				<b>V0</b>
<b>Process Purpose</b>		Search and provision of the different processes with qualified, competent and sufficient personnel for a better performance through a rigorous management while providing all the necessary and favorable conditions of development and strong contribution.		
<b>Inputs</b>	<b>Activities</b>		<b>Outputs</b>	
QHSE policy; Recruitment needs; Training offers; Completed evaluation form; Leave planning; CV and bulletins; Mission order; Convocation; Regulations (laws, decrees)	<ul style="list-style-type: none"> <li>- Recruit qualified personnel according to a pre-established recruitment process</li> <li>- Motivate and retain staff</li> <li>- Ensure a good social climate with partners to avoid conflicts</li> <li>- Evaluate the staff</li> <li>- Carry out specific training to the activities</li> <li>- Supervise and manage personnel in case of transfer or restructuring</li> <li>- Modernize the management of the process</li> </ul>		Activity reports; Employees; Evaluation form; Employment contracts; Payroll element; Documents Parafiscal; Administrative documents; Job descriptions; Salary slips	
<b>Process Pilot</b>	<b>Resources</b>		<b>Applicable reference documents</b>	
Human Resources Manager	Human; Material; Financial.		Les normes : ISO : 9001 :2015, ISO : 14001 :2015, ISO : 45001 :2018	
<b>Indicators</b>		<b>Calculation Method</b>	<b>Measurement frequency</b>	
Rate of access to training		Total number of employees/ Number of attended employees in training	Annual	
Rate of Absenteeism		Number of absence hours / Number of worked hours during the period x 100	Semi-Annual	

**Table 19:** Human resources process sheet (Elaborated by our care)

### 2.3. The QHSE policy project:

Aware of its responsibility towards its stakeholders and its context, AMENHYD has set more ambitious objectives in terms of quality management, health & safety at work and environment by adopting a QSE policy that clearly states its commitment as shown in Figure 23.

**Figure 23:** QHSE Policy of AMENHYD



**Source:** Elaborated by our care

### 3. QSE Risk Analysis:

Through collaboration with the QHSE department, we were able to carry out the risk and opportunities analysis for the equipment manufacturing process as well as the occupational and environmental risks analysis. During this work, we've adopted the FMECA method (Annex 8) then we obtained the results shown in the following tables:

#### 3.1 Analysis of manufacturing process risks and opportunities:

##### 3.1.1 Manufacturing process risks:

**Table 15:** Identification and evaluation of process risks (FMECA).

N°:	Process	Risk wording				Risk assessment		
		Description	Source	Causes	Effects	G	F	C
01	Equipment Manufacturing	Delay in the establishment and release of studies.	Internal /External	Failure of the design office	Delayed delivery of products Delayed payments	2	1	2
02		Raw material stock shortage (sheet metal, special parts...)	Internal /External	Failure of suppliers Failure to launch orders on time	Failure to meet contractual deadlines	2	2	4
03		Delay in delivery of equipment to accidents	Internal	Non-compliance of production schedules	Failure to meet contractual deadlines	2	1	2
04		Late payment of subcontractors and suppliers.	Internal	Cash flow problem	Supply problems	2	2	4
05		High failure frequency rate	Internal	Incorrect handling of machines Lack of preventive maintenance	Delayed delivery of products	2	2	4
06		Work accidents	Internal	Lack of security awareness Incorrect use of tools Poor quality of PPE	Employee Injuries	3	2	6
07		disposal of hazardous waste	Internal/ External	Negligence (e.g. smoking) Bad storage of dangerous materials (gases, oxygen, acetylene ...)	Environment corruption	2	2	4
08		Equipment Failure	Internal	Aging equipment, operator error, lack of preventive maintenance	the production line stopped working	2	3	6

**Source:** Elaborated by our care

### 3.1.2 Manufacturing Process Opportunities:

**Table 16:** Opportunities of the Manufacturing Process

<b>N:</b>	<b>Opportunities</b>	<b>Action to seize the opportunity</b>	<b>Responsible for the action</b>	<b>Resources needed</b>
<b>01</b>	Existence of a load plan with AMENHYD	Provide the necessary means to meet project expectations	Director of the manufacturing unit	Material, human and financial resources
<b>02</b>	Availability of the group's partners for manufacturing activities (electrical and mechanical parts)	Establish partnership contracts	Director of the manufacturing unit	/
<b>03</b>	Professional skills and mastery of the work	To highlight the existing skills in the company	Director of the manufacturing unit	Financial resources

**Source:** Elaborated by our care

### 3.2 Occupational risks analysis:

**Table 20:** Occupational risk assessment.

Process	Activities	Hazards	Damage/Risk	Risk Assessment			Recommendation
				G	F	C	
Common areas	Movement and access to the construction site	Traffic accident	Pedestrian and driver collisions / injuries	2	1	2	Implementing safety signs / respecting the highway code / Offering driving courses and marking out traffic lanes
		Circulation of the traps in the working area	Pedestrian collisions by vehicles / risk of injury	2	1	2	Limiting the speed of machinery traffic / Implementing safety signs / Offering training courses on driving machinery and marking out the traffic lanes
	Truck loading	Falling pieces	Trauma risk /injury to people in the vicinity	2	2	4	Wearing PPE / staff raising awareness / Marking out the work area and prohibiting access without PPE
		Manual handling	Chronic lumbar disease Hand abrasions	2	2	4	Making the personnel aware of the working postures/ wearing safety gloves
	Assembly of the crane	Accident due to improper crane composition or placement / Crane overturn	Crushes and injuries	3	1	3	Marking out the work area
		Falling pieces, accessories or tools	Trauma risk /injury to people in the vicinity	3	2	6	Adaptation of loads to the rope resistance / marking out the work area and prohibiting access without PPE / equipment and ropes inspection
		Material damage due to a poorly prepared work site.	Fall of full feet	2	2	4	Preparing the work area / staff raising awareness / specific PPE
		Work at height.	Fall from height / injuries	3	2	6	Scaffold inspection and compliance / staff raising awareness / Specific PPE

Process	Activities	Hazards	Damage/Risk	Risk Assessment			Recommendation
				G	F	C	
Common areas	Use of compaction equipment	Traffic accident	Pedestrian and driver collisions / injuries	2	1	2	Offering driving courses and marking out traffic lanes
		Exposure to chemical agents	Burns / Skin toxicity and respiratory disease	1	2	2	Using gloves, mask and safety glasses
		Fire hazard	Burns	1	2	2	Gas detection /smoke detection /Inspection of the material before the beginning of the work : color code, fire extinguisher nearby, grounding /EPI mandatory
	Transport of scrap bars and unloading	Presence of a person under the load	Load drop, crushing, death	3	2	6	Staff raising awareness / specific PPE / marking out the work area
		State of the handling equipment	Accidental detachment of the load, crushing of the person	3	1	3	Adaptation of loads to the rope resistance / marking out the work area and prohibiting access without PPE / equipment and ropes inspection
		Lack of attachment of the bars and transported elements	Load drop of the truck, crushing of the person	3	1	3	Staff raising awareness / specific PPE
	Electricity supply	Electrical accidents	Electrocution	3	2	6	Installation of safety signs / total isolation
		Fire	Burns / injuries	2	1	2	Staff raising awareness / specific PPE
		Spark due to electricity	Eye / skin irritation	2	1	2	Wearing protective mask

**Source:** Elaborated by our care

### 3.3 Environmental risks Analysis:

**Table 21: Environmental Analysis**

Process	Activities	Sub-activities	Environmental aspects	Environmental impacts	Assessment			Significance
					G	F	C	
<b>Material Management</b>	Material allocation	Transportation and shipping	Fuel use	Air pollution Noise pollution	1	2	2	insignificant
	Spare pieces management	Receipt of spare pieces and their transfer to the project sites	Fuel use unpacking spare pieces (Packaging waste)	Exhaustion of natural resources Pollution by non-biodegradable waste	1	2	2	
<b>Installation of construction site</b>	Lifting operation	Installation of cranes	Carbon dioxide emission Oil leakage Energy consumption	Air pollution Ground pollution Exhaustion of natural resources	1	1	1	significant
<b>Management</b>	Administration	Printing and duplication of documents	Paper consumption Ink cartridge consumption Electricity consumption Noise emission	Exhaustion of non-renewable natural resources (deforestation) Ground pollution (solid waste) Exhaustion of non-renewable natural resources Noise pollution	2	2	4	
		Working environment	Consumption of coffee, water, tea...	Wide use of plastic goblets	Ground pollution (Solid waste)	2	2	4

<b>Installation of life base</b>	Waste disposal	Truck loading	Noise emission Energy consumption Oil spillage Dust emission	Noise pollution Exhaustion of natural resources Ground pollution Air pollution	1	2	2	insignificant
<b>Common Areas</b>	Traffic areas	Circulation of staff and equipment	Carbon dioxide emission Dust emission Energy consumption (fuel oil) Accidental spillage of fuel and oil	Air pollution Air pollution Exhaustion of natural resources	2	3	6	very significant
	Heater	Use of heater	Energy consumption Fire	Exhaustion of natural resources Air /floor pollution / landscape degradation Exhaustion	3	1	3	Significant
	Sanitary	Use of sanitary facilities	Water consumption Energy consumption (lighting) Lack of hygiene	Exhaustion of natural resources Air /floor pollution / landscape degradation	2	3	6	very significant
	Diesel tank	Lifting/Installation and use of the tank	Noise emission Release of smoke / toxic gas Emission of dust Energy consumption (fuel oil)	Noise pollution Air pollution Air pollution Exhaustion of natural resources	1	1	1	significant

**Source:** Elaborated by our care

## **CONCLUSION**

Throughout our internship, we have tried to follow a rigorous approach during which we have been able to answer our research question that has served us as a guideline. We recall that it is announced as follows:

**«How to successfully implement an integrated management system in accordance with the requirements of: ISO 9001:2015, ISO 45001:2015, ISO 14001:2018 standards within the company AMENHYD? »**

To conduct this study, we addressed in the first chapter some theoretical concepts on the integrated management system QSE through a literature review. Then, in the last chapter, we returned to the center of our theme through a purely qualitative methodology that consisted of describing and explaining the obtained results supported by documentary research, participant observation, diagnosis, surveys and direct interviews with the executives of the host organization “AMENHYD”.

In addition, in the first section of the practical framework, we conducted an inventory of the existing situation using a self-assessment grid (checklist) of the three standards ISO 9001: 2015, ISO 14001: 2015 and ISO 45001:2018 in order to detect non-conformities and dysfunctions and to establish an adequate action plan.

In a second step, we conducted working sessions with the quality manager based on an exploratory brainstorming and we also launched an online questionnaire in order to better understand the context of the host organization and design its IMS. Due to the obtained results, we were able to update the list of the relevant interested parties and their needs in accordance with the requirements of ISO 14001:2015 and ISO 45001:2018 standards. Models of process sheets and a QHSE policy were also proposed. Then we identified the main QSE risks of AMENHYD’s company. These risks were assessed in order to establish an effective action plan to eliminate or reduce the consequences of these risks to an acceptable level.

Due to the limited period of internship, the realization of this thesis has encountered some difficulties. We only worked on the non-conformities detected in chapters 4, 5, 6 and 7 of the three standards. But this did not stop us from carrying out this research work.

Finally, the integrated management system QSE is linked much more to a commitment of the company towards its environment than to a customer demand. It is considered a necessity and not a fashion for the organizations that implement them.

The contribution to the implementation of the integrated management system (QSE) within “AMENHYD” was a real source of learning and application of the skills and knowledge developed during our university studies. The work we did during our internship period allowed us to discover and understand the stakes of a solid organization that the IMS can provide. In particular, by saving time, increasing efficiency, and above all, providing a better response to customer needs. This internship was therefore an opportunity to improve and deepen theoretical knowledge in the field of environmental, quality and safety management while confronting them with the reality of the business world.

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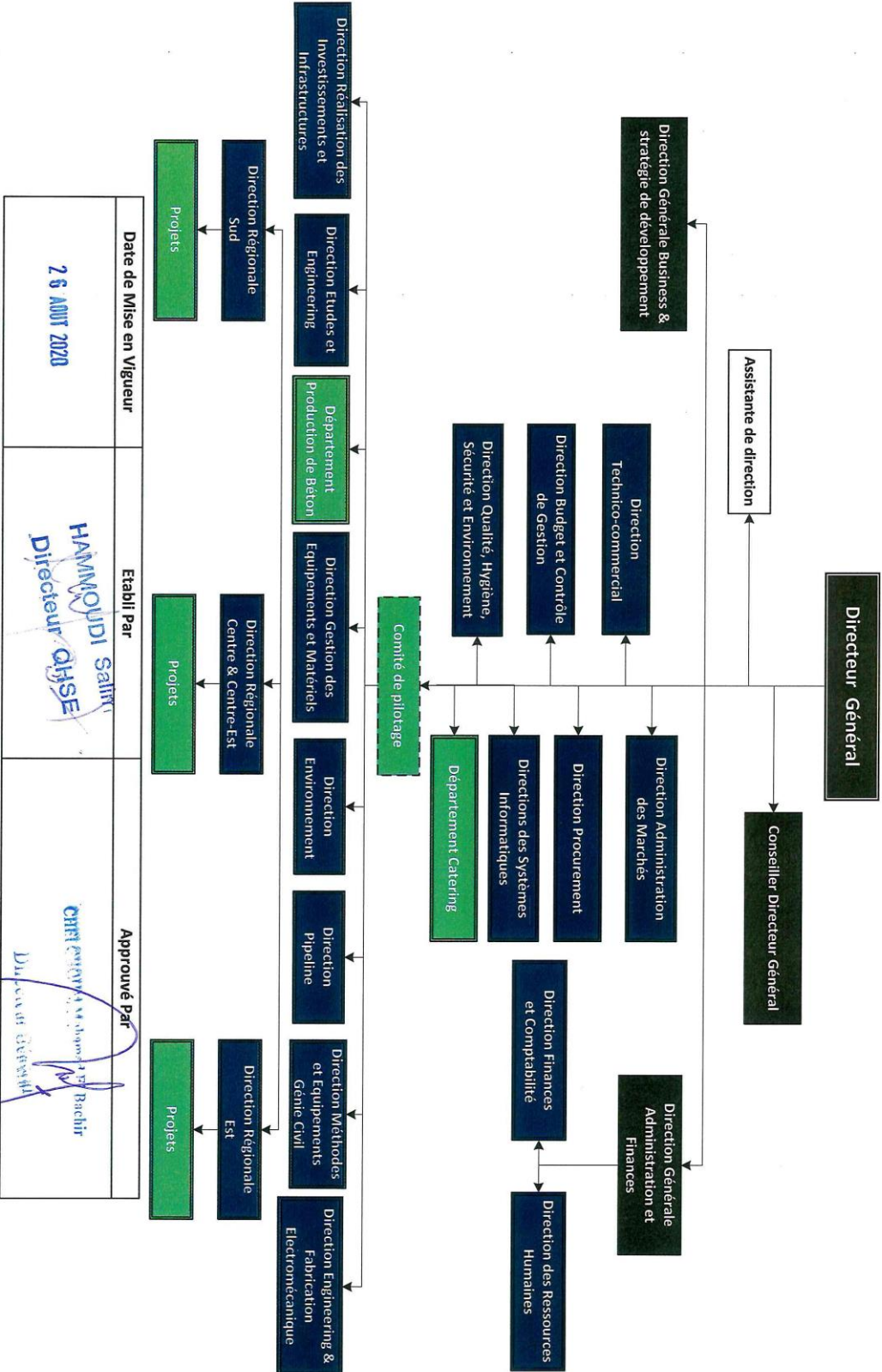
# **ANNEXES**

**ANNEX n°1:  
THE ORGANIZATION  
FLOWCHART**



### Organigramme Direction Générale

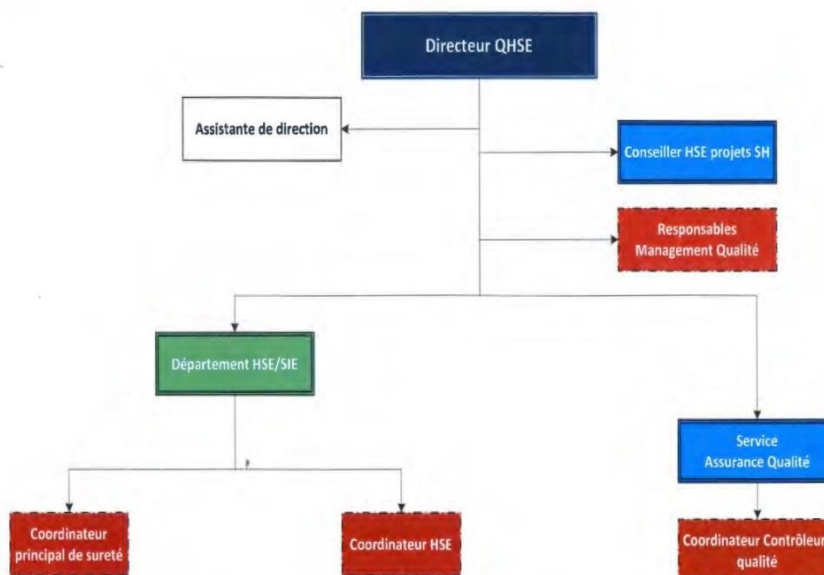
Ref: ORG.DG.V8  
Date: 26/08/2020  
Page: 1/1



	Etabli Par	Approuvé Par
26 AOUT 2020	 HAMMOUDI SALIM Directeur QHSE	 CHERIF M. ALI BACHIR Directeur Général
Date de Mise en Vigueur		

**ANNEX n°2:**  
**QHSE FLOWCHART**

	<b>Organigramme</b> <b>Direction Qualité, Hygiène, Sécurité et Environnement (DQHSE)</b>	Ref: ORG.DG.DQHSE.V7
		Date: 26/08/2020
		Page: 1/1



Date de Mise en Vigueur	Etabli Par	Approuvé Par
26 AOUT 2020	HAMMOUCI Salim Directeur QHSE	CHELCHOLIM Mohamed El Bachir Directeur Général

**ANNEX n°3:**  
**QMS INVENTORY**  
**DOCUMENTS**

	<h1>MANUEL QUALITÉ</h1>	Réf: MQ.01.V10
		Date : 14/01/2021
		Page : 22 sur 23

## ANNEXE 06 : Tableau de correspondance ISO 9001 : 2015

Ch.	Exigence norme ISO 9001 : 2015	SMQ AMENHYD
<b>4</b>	<b>Contexte de l'organisme</b>	
4.1	Compréhension de l'organisme et de son contexte	MQ § 6.1
4.2	Compréhension des besoins et des attentes des parties intéressées	Analyse du contexte de l'entreprise
4.3	Détermination du domaine d'application du SMQ	MQ § 2.2
4.4	Système de management de la qualité. et ses processus	MQ § 6.3
<b>5</b>	<b>Leadership.</b>	
5.1	Leadership et engagement.	La Politique Qualité
5.2.	Politique.	
<b>5.3</b>	Rôles, responsabilités et autorités au sein de l'organisme.	MQ § 6.4 Processus –Procédures & Mode Opératoires
<b>6</b>	<b>Planification.</b>	
6.1	Actions à mettre en œuvre face aux risques et opportunités.	MQ § 6.5 document « ANALYSE DES RISQUES ET OPPORTUNITES AMENHYD SPA ». PRQ.SMQ.05 PRQ.SMQ.06
6.2	Objectifs qualité et planification des actions pour les atteindre.	MQ § 6.6 document objectif et plan d'action.
6.3	Planification des modifications.	Revue de processus Revue de direction Document objectif et plan d'actions
<b>7</b>	<b>Support.</b>	
7.1	Ressources.	
7.1.1	Généralités.	
7.1.2	Ressources humaines.	PRQ.GRH.25.
7.1.3	Infrastructure.	PRQ.MAT.08. PRQ.17. PRQ.42
7.1.4	Environnement pour la mise en œuvre des processus.	PCQ.HSE
7.1.5	Ressources pour la surveillance et la mesure.	IMP.MTR.17
7.1.6	Connaissances organisationnelles.	Doc connaissances organisationnelle Pyramide qualité
7.2	Compétences.	PRQ.GRH.35. PRQ.FOR.26
7.3	Sensibilisation.	IMP.SMQ.25
7.4	Communication.	
7.5	Informations documentées.	PRQ.01.
<b>8</b>	<b>Réalisation des activités opérationnelles.</b>	

	<h1>MANUEL QUALITÉ</h1>	Réf: MQ.01.V10
		Date : 14/01/2021
		Page : 23 sur 23

Ch.	Exigence norme ISO 9001 : 2015	SMQ AMENHYD
8.1	Planification et maîtrise opérationnelles.	PRQ.PLA.02
8.2	Exigences relatives aux produits et services.	PCQ.COM PRQ.FAB.01 IMP.COM.05.
8.2.1	Communication avec les clients.	Cahier de chantier Courrier PV de réunion
8.3	Conception et développement de produits et services.	MOQ.ETS.09. SPCQ.ETS.01 MOQ.ETS.02
8.4	Maîtrise des processus, produits et services fournis par des prestataires externes.	MQ § 6.8 PCQ.PRC - PRQ.ACH.09 - PRQ.ACH.14 PRQ.ACH.22 - PRQ.ACH.10
8.5	Production et prestation de service.	
8.5.1	Maîtrise de la production et de la prestation de service.	MOQ.TRV.02, 03, 04, 05, 29, 30, 31,44, 32, PAQ
8.5.2	Identification et traçabilité.	MOQ.PBT.17
8.5.3	Propriété des clients ou des prestataires externes.	MQ § 6.9
8.5.4	Préservation.	MOQ.PRC.50
8.5.5	Activités après livraison.	PAQ - PCQ.TRV PV de Réception - PRQ.04 - MOQ.TRV.35 PRQ.FAB.02
8.5.6	Maîtrise des modifications.	PAQ
8.6	Libération des produits et services.	MOQ.PBT.17 IMP.TRV.16 ,45,53,33,24,46,47,15,32,55,57,58.
8.7	Maîtrise des éléments de sortie de processus, des produits et services non conformes.	PRQ.04 MOQ.TRV.35
<b>9</b>	<b>Évaluation des performances.</b>	
9.1	Surveillance, mesure, analyse et évaluation	
9.1.1	Généralités.	
9.1.2	Satisfaction du client.	IMP.DQHSE.10 PRQ.SMQ.24 – PRQ.07
9.1.3	Analyse et évaluation.	Revue de processus Revue de direction
9.2	Audit interne.	PRQ.03
9.3	Revue de direction.	MOQ.SMQ.11 - Revue de direction
<b>10</b>	<b>Amélioration.</b>	
10.1	Généralités.	
10.2	Non-conformité et actions correctives.	PRQ.02 - PRQ.24
10.3	Amélioration continue.	PRQ.02 -PRQ.SMQ.05 – PRQ.07 - PRQ.SMQ.24 revue de processus –revue de direction

**ANNEX n°4:**

**QSE DIAGNOSIS ACCORDING TO  
ISO 9001:2015, ISO 14001: 2015 AND  
ISO 45001: 2018 STANDARDS.**

Evaluation grid		
Level of compliance		
<b>Level 1</b>	25%	<b>Insufficient:</b> The action is not carried out or is carried out in a very random way
<b>Level 2</b>	50%	<b>Informal:</b> The action is sometimes carried out informally.
<b>Level 3</b>	75%	<b>Convincing:</b> The action is formalized and carried out in a fairly convincing manner.
<b>Level 4</b>	100%	<b>Compliant: GREAT!</b> The formalized action is realized, improved and traced.

Subchapter	
Standards	Colors
<i>ISO 9001:2015</i>	Dark Blue
<i>ISO 14001:2015</i>	Green
<i>ISO 45001:2018</i>	Red

QSE Diagnosis														
N°:	Chapter	Sub- Chapter	Level of compliance									Evidence	Comments and remarks	
			ISO 9001			ISO 14001			ISO 45001					
4	Organizational context	4.1 Understanding the organization and its context											Contexte.V4 IMP.SMQ.26.V3	During the diagnosis, we found that : <ol style="list-style-type: none"> <li>The internal and external issues related to AMENHYD are identified, the first time in 2018, reviewed in 2020 and then in 2021 by integrating new issues related to OHS and environmental respects. The analysis of internal and external issues fully meets the 9001, 14001 and 45001 requirements.</li> <li>The company has also identified the different stakeholders and their needs and expectations, except for the environment and OHS. This information is monitored and updated through audits, process reviews and management reviews</li> <li>The scope of IMS is determined and includes all necessary components. It must be formalized and maintained in the form of documented information.</li> <li>The company has identified the different processes without integrating the environmental and occupational health and safety dimensions. All process information are documented in 'process review' The company has determined all the means and resources that the IMS needs.</li> </ol>
		4.2 Understanding the needs and expectations of workers and other stakeholders												
		4.3 Determining the scope of the integrated management system												
		4.4 Integrated management system and its processes												
			100%			56%			56%			70%		



QSE Diagnosis														
N°:	Chapter	Sub-chapter	Level of compliance									Evidence	Comments and remarks	
			ISO 9001			ISO 14001			ISO 45001					
7	Support	7.1 Resources												During the diagnosis it was found that : 7.1.1 The management ensures the availability of the necessary resources (human, material and organizational) to the IMS to meet the contractual requirements of its customers and partners  7.1.2 The availability of a human resources management manual distributed to all sites and mastered by all human resources staff. The availability of personal protective equipment is ensured.  7.1.3 A lack of technical mastery of the equipment. Raw material stock shortage (sheet metal, special parts...) Failure of the design office to update the manufacturing drawings Diagnostic sheets and material intervention reports are not deployed.  7.1.5 The provisions relating to the identification of equipment for monitoring and measurements, the planning of calibration operations are mastered with the related traceability.  7.1.6 The technical standards that enter into the QMS requirements in terms of determining the organizational knowledge necessary to obtain the conformity of products and services and the implementation of processes are not mastered (equipment manufacturing process). Data and documents relating to the environment and health and safety are not currently available
		7.1.1 General												
		7.1.2 Human resources												
		7.1.3 Infrastructure												
		7.1.4 Environment for the implementation of the processes												
		7.1.5 Resources for Monitoring and Measurement												
		7.1.6 Organizational knowledge												
			75%	66%	66%	69%								



**ANNEX n°5:  
PLANNING**

<b>Actions</b>	<b>Deliverable</b>	<b>Responsible</b>
<b>Knowledge of the company</b>		
Meeting with the QHSE director and the quality manager.	/	Trainee + QHSER + QMR
<b>Status and planning</b>		
Consult QMS documents	Quality policy, quality manual, list of processes, procedures, operating procedures and mandatory records, etc.	Trainee + QMR
Plan and carry out the QMS diagnosis		
Prepare the QSE auto-diagnosis according to the Requirements of ISO9001, ISO14001 and ISO 45001 standards.	Check list	Trainee + QHSER
Carry out the QSE auto-diagnosis		Trainee
Develop an action plan		Trainee
<b>Organizational Background</b>		
Identify internal and external issues		
Define the parties involved and their requirements	Updated list of interested stakeholders	Trainee + QMR
Develop the process map for the environment and occupational health and safety Work.	Updated process mapping	Trainee
Develop the QHSE Management process sheet	QHSE Management process sheet	Trainee
<b>Leadership and Engagement</b>		
Revise the quality policy and integrate new quality, environmental and occupational health and safety objectives.	QSE Policy	Trainee + QHSER
<b>Planning</b>		
QSE risks analysis	Risk and opportunity analysis sheet (equipment manufacturing process) Environmental analysis Occupational risks analysis	Trainee + QMR

**ANNEX n°6:**  
**CERTIFICATE OF**  
**REGISTRATION**



**BUREAU  
VERITAS**

## AMENHYD SPA

Lot Boushaki F N°28 Bab Ezzouar, Alger, Algérie.

Bureau Veritas Certification Certifie que le système de management de l'organisme susmentionné a été audité et jugé conforme aux exigences de la norme :

### ISO 9001:2015

Domaine d'activité

**Etudes, réalisation des ouvrages hydrauliques, Génie Civil, des travaux d'aménagement environnementaux & fabrication des équipements de process.**

Date de la première certification : **12 Janvier 2022**

Date d'expiration du cycle Précédent : **NA**

Date d'audit de Certification : **28 Juillet 2021**

Date de début du cycle de Certification : **12 Janvier 2022**

Sous réserve du fonctionnement continu et satisfaisant du système de management de l'organisme, ce certificat est valable jusqu'au: **11 Janvier 2025**

**Certificat N ° AFR 22.00216 FR**

**Version: N °1**

**Date d'émission: 12-01-2022**



0008

Adresse de l'organisme de certification: 5e étage, 66 Prescot Street, Londres E1 8HG, Royaume-Uni  
Bureau local: Adresse: **Lot N° 94, Centre des Affaires de la commune de Bab-Ezzouar, Alger**

Des informations supplémentaires concernant le périmètre de ce certificat ainsi que l'applicabilité des exigences du système de management peuvent être obtenues en consultant l'organisme. Pour vérifier la validité de ce certificat, vous pouvez téléphoner au : 00 213 (0)21 60 57 28/90



**BUREAU  
VERITAS**

**Amenhyd SPA**

**ISO 9001:2015**

**Etudes, réalisation des ouvrages hydrauliques, Génie Civil, des travaux d'aménagement environnementaux & fabrication des équipements de process.**

<u>Site Name/Location</u>	<u>Site Address</u>	<u>Site Scope</u>
Direction Générale	Lot Boushaki F N°28 Bab Ezzouar- Alger	Etudes, réalisation des ouvrages hydrauliques, Génie Civil, des travaux d'aménagement environnementaux & fabrication des équipements de process.
Direction logistique	Bordj El Kiffane- Alger	
Unité de production de béton	Baba Ali-Alger	
Unité de fabrication des équipements de process	Boudouaou & Hammadi- Boumerdes	





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Adresse de l'organisme de certification: 5e étage, 66 Prescott Street, Londres E1 8HG, Royaume-Uni  
Bureau local: Adresse: **Lot N° 94, Centre des Affaires de la commune de Bab-Ezzouar, Alger**

Des informations supplémentaires concernant le périmètre de ce certificat ainsi que l'applicabilité des exigences du système de management peuvent être obtenues en consultant l'organisme. Pour vérifier la validité de ce certificat, vous pouvez téléphoner au : 00 213 (0)21 60 57 28/90

**ANNEX n°7:**  
**BACKGROUND RESEARCH**

	Amenhyd's company Direction: QHSE Process pilot: Salim Hammoudi Email: <a href="mailto:hammoudi.salim@amenhyd.com">hammoudi.salim@amenhyd.com</a>			
The national higher school of management Quality Management Student: Djihane BALA Email : <a href="mailto:d.bala@ensm.dz">d.bala@ensm.dz</a> / <a href="mailto:djihanebala@gmail.com">djihanebala@gmail.com</a>				
<b>Interview Guide</b>				
In order to obtain a Master's degree in Quality Management at the National School of Management (ENSM, Kolea).				
Therefore, I ask you to answer this questionnaire which will help me to prepare my thesis. The answers of this survey will be subject to an analytical and statistical treatment. The main objective is to find out more about the issues that have an impact on the ability to achieve the expected results of its integrated management system QSE, this will make it possible to identify points of attention and to propose (if necessary) areas for improvement.				
I would like to specify that all the data you consider as confidential do not need to be mentioned and I reassure you to keep the anonymity and the use of the information just for scientific purposes.				
<i>Note: The estimated time to complete this questionnaire is 10 minutes.</i>				
<b>Generals</b>				
1. If you had to define an integrated management system (IMS), what would it be?				
2. What is the status of the IMS deployment in AMENHYD Spa?	Fully deployed	In the process of being deployed	Not deployed	
3. Has the company's management demonstrated its commitment to the implementation of an integrated management system?	Yes	No	Other	
<b>Context</b>				
1. In which year did you initiate the integrated management system approach?				
2. Before the integration, what type of organization was deployed?	Quality	Environment	Security	
3. Today, on which normative references is the description of your SMI based?	ISO 9001: 2015	ISO 14001: 2015	ISO45001: 2018	
4. Is the company certified for one or more standards?	ISO 9001: 2015	ISO 14001: 2015	ISO45001: 2018	
5. Why did the AMENHYD Spa's company make the decision to be or not to be certified?				
<b>Steering</b>				
1. In AMENHYD Spa, who is in charge of steering the IMS?	Director + Quality manager	Quality manager + process pilots	Other	
<b>Staff support</b>				
1. How do employees participate in the animation of the IMS?	Process review			
	Definition of procedures and/or operating modes			
	Control sheets to be filled in			
	Employees do not participate			

<b>Description of the IMS</b>			
1. Have you described all the processes necessary to achieve your objectives?	Yes	No	Other
2. What elements are measured to evaluate the effectiveness and efficiency of your approach?	The documentation system	Customer satisfaction	The processes
3. What tools and/or methods do you use?	Internal/ External audits	Satisfaction survey	Management reviews
<b>Vision of the staff surveyed</b>			
1. Did you identify any limitations or constraints to the IMS description? If yes, which ones?			
2. Do you think that a detailed description of the IMS is a performance factor for the AMENHYD spa's company and why?			
3. Indicate the type of impact that the implementation of the IMS has had on your operations :	Operational	Organizational	Skills Management
4. In your opinion, has the IMS had a positive or negative impact on the quality of life at work?			
<b>Staff support</b>			
1. How do employees participate in the animation of the IMS?	Process review		
	Definition of procedures and/or operating modes		
	Control sheets to be filled in		
	Employees do not participate		

**ANNEX n°8:**  
**QSE RISKS ANALYSIS**

Scale	Gravity	Description of gravity
1	Low (minor)	Requires some corrective action.
2	Medium	Requires corrective action as soon as possible.
3	serious (important)	Requires urgent action.
4	very serious (major)	Requires urgent action, and very costly corrective action.

Frequency			
Scale		Standard operation	Accidental operation
4	Frequent	Continuously or at least once a day	Very likely event. Has already occurred on the site or many times on other sites
3	Common	At least once a week	Probable event. Never occurred in close proximity at the site on the site but has been observed repeatedly at other sites
2	Rare	At least once a year	Unlikely event. Never occurred in close proximity at the site on the site but sometimes on other sites
1	Extremely rare	Less than once a year	Unlikely event. Never happened on the site and very rarely on other sites

Criticality Scale			Gravity			
			Gravity Minor	Gravity Low	Gravity Medium	Gravity Major
			1	2	3	4
Probability	Very low probability	1	1	2	3	4
	Low probability	2	2	4	6	8
	Medium probability	3	3	6	9	12
	High probability	4	4	8	12	16

	Acceptable risk		Medium risk		Unacceptable risk
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