

# Quality, Environment and Health Integrated Management Systems: A Literature Review

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**Abstract:** The context of the research made in this article is the harsh economic environment where in order to stay on the market organizations need to reduce production cost to make more profit but also to meet the quality, environment, and health and safety requirements. The implementation of the standards in the organization involve an allocation of resources both human and financial and all this are time consuming, the necessity of implementing two or more standards make this allocation of resources to increase, in this conditions applying an integrated standards model is shown to be a more effective way then applying the standards independently. The problem that arises is that in order to adopt the integrated version of standards there have to be made some changes at the organizational level. This article analyzes the principal models of integration management systems found in the literature, highlights the benefits of the three standards. This article can be also used as a base for future studies regarding the integrated management systems and future implementation of other management systems like the management system of innovation.

**Keywords:** Integrated Management Systems, Quality Management System, Environmental Management System, Occupational Health, Safety Management System

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## 1. Introduction

A management system is the framework of processes and procedures used to ensure that an organization can fulfill all tasks required to achieve its objectives [1]. A management system is a tool that aids the organization, being used to communicate the interdependence between people and processes, allowing decision making as provided by fair analysis, which will make it possible to increase profits [2].

The management system is the interconnection of components in order to achieve a given objective. These components include the organization, resources and processes. Therefore, people, equipment and culture are part of the system as well as the documented policies and practices [3].

A management system consists of four main elements [2]:

- management policy and objectives, acting as a guide to the organization;
- management responsibilities, defined so that each person

involved should know what are the needs and requirements of their job;

- define the processes, thus establishing the connection between people and organizational objectives;
- data distribution and analysis (documents and records), so as to ensure an improved organizational performance.

## 2. Characteristics of Current Management Systems

### 2.1. The Main Characteristics of Quality Management Systems

Quality is one of the most important factors for most organizations and the requirements of global competitiveness. The main objective of quality is customer satisfaction, which

together with employee satisfaction represents the key performance indicator of an enterprise and an important indicator of business effectiveness [4].

According to Santos and Escanciano (2002), the quality management system is "a set of managerial structures or planned systematic work methods considered by the organizations as effective ways to bridge customer satisfaction".

Concerns about quality management systems led to the development of international standards of quality management, the most popular being the ISO 9000 family of standards. According to these standards, quality management system is that management system that focuses on and keeps an enterprise under control in terms of quality. The actual design and implementation of such a system depends on business-specific objectives, products, processes and activities [5].

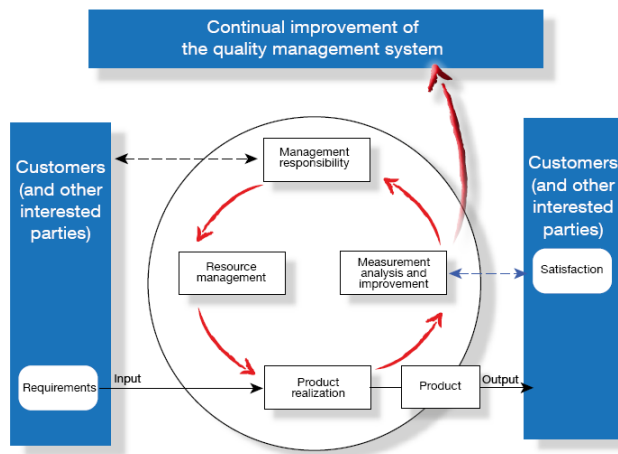


Figure 1. The process approach to quality management system (the author's proposal).

ISO 9001 standard proposes a model of process approach to quality management (Figure 1). The model considers that, in defining requirements and data entry, the customer plays an important role. Therefore, the graphical representation includes customers at both the beginning and end of the

quality improvement cycle. This cycle is based on the PDCA (Plan-Do-Check-Act) mechanism proposed by Edwards Deming and known as the Shewhart-Deming Cycle.

The last stage is implementing the new product, process or service in the market, commercializing and obtaining added value from the innovative idea. Some authors show a further step, after the product, process or service is launched, in order to learn and prepare for another innovative process [6].

In order to show the ability to provide products that meet requirements, the enterprise must identify and conduct many associated processes. A process is any activity that uses resources and turns input data into output data. As stated in ISO 9001 standard, "the process approach is defined as the identification and systematic management of processes applied within the enterprise, as well as the interactions between these processes."

The ISO 9000 international standards were developed primarily to facilitate trade relations, especially at regional and international level, and to give customers more confidence on the ability of a particular tradesman to consistently satisfy requirements related to product and service quality offered. They are general standards, including requirements regarding the enterprise's quality management system and recommendations to improve performance [7].

The implementation of a quality management system has positive implications for all the components of the organizations' management system (informational, organizational, decision-making, human and methodological-managerial). Most users get benefits from the process of implementing the ISO 9001 standard requirements within the organization. Generally, initial advantages relate to improved organization and communication. The advantages become significant through effective internal auditing and by analyzing the performance of the quality management system performed by the management.

Following the third review from 2008, the ISO 9000 family of standards includes four basic standards (Table 1), accompanied by a number of technical reports.

Table 1. Basic standards of the ISO 9000 family of international standards [8].

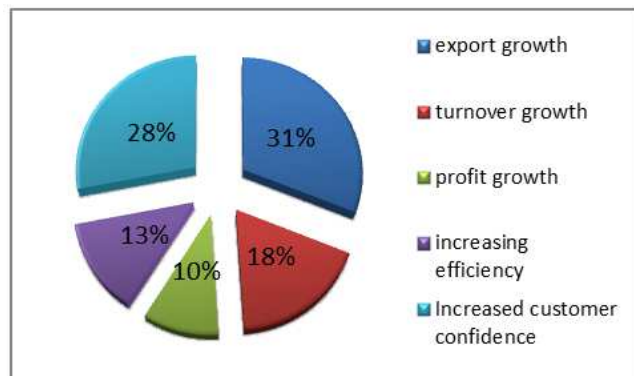
No.	Name	Application domain
1	ISO 9000:2005 Quality management systems – Fundamentals and vocabulary	Describes basic principles of quality management and specifies terminology related to those systems.
2	ISO 9001:2008 Quality management systems - Requirements	Specifies requirements for a quality management system where an organization needs to demonstrate its ability to consistently provide product that meets customer and applicable statutory and regulatory requirements, and aims to enhance customer satisfaction through the effective application of the system.
3	ISO 9004:2000 Quality management systems - Guidelines for improving performance	Provides advice on quality management systems, applicable to improve enterprise performance, so as to better meet customer requirements and the requirements of other stakeholders.
4	ISO 19011:2002 Guidelines for quality and/or environmental management systems auditing	Provides guidance on the principles of auditing, managing audit programs, conducting quality management system audits and environmental management system audits, as well as guidance on the competence of quality and environmental management system auditors.

This structure was meant as a simplification of the ISO 9000 family of standards (whose 1994 edition has expanded greatly, reaching about 20 standards, assigned to specific areas), ensuring a better adaptation to the needs of different

categories of users, so that standards become an effective tool that can increase enterprise competitiveness [8].

The most important advantage of the implementation and certification of quality management systems is internal,

meaning that a certified system demonstrates that the development of enterprise processes, from market research to the supervision of products in use, meets the reference standard. But overall, the main advantages for businesses also involves external aspects (increased customer confidence, improved image, improved market position, etc.).



**Figure 2.** The advantages obtained after quality management system certification (the author's proposal).

All the advantages mentioned above provide the prerequisites for improving the economic and financial results of enterprises: increase sales, market share and profit. According to the main interests of businesses, the most important results obtained by enterprises after quality management system certification in accordance with ISO 9001, are shown in Figure 2.

After certification, compliance with the requirements of the established referential must be ensured, which requires

continuous efforts to improve all processes within the enterprise, avoiding the appearance of any kind of deficiencies throughout the entire trajectory of the product.

## 2.2. The Main Features of the Environmental Management System

The current economic context, marked by globalization, has led in recent years to the awareness of the interdependence between the environment and development, as well as the increasing demands from society regarding environmental protection, requirements embodied in regulations that are becoming more stringent. Production processes have an important impact on the environment. To promote the reduction of pollution, national, regional and international models of environmental management have been developed to facilitate the control of all environmental aspects related to businesses [9].

The implementation of an environmental management system enables the development of activities in a planned and systematic manner, finding ways to improve the environmental performance of companies [10]. The role of this system is to facilitate the control of all processes throughout the whole product development process, so as to minimize their negative impact on the environment [11].

Similarly to the ISO 9000 family of standards, the International Organization for Standardization has developed the ISO 14000 family of standards for environmental management systems [12]. This family of standards is presented in Table 2.

**Table 2.** The ISO 14000 family of standards for environmental management systems.

Nr. Crt.	ISO Standards	Standard name
1	SR EN ISO 14001:2005	Environmental management systems. Requirements with guidance for use.
2	SR EN ISO 14001:2005/C91:2005	Environmental management systems. Requirements with guidance for use
3	SR ISO/TS 14048:2005	Environmental management systems. Live cycle assessment. Data documentation format
4	SR EN ISO 14040:2007	Environmental management systems. Live cycle assessment. Requirements and guidelines
5	SR EN ISO 14040:2007	Environmental management systems. Live cycle assessment. Principles and framework
6	SR ISO/TR 14062:2008	Environmental management systems. Integrating environmental aspects into product design and development
7	SR EN ISO 14001:2005/AC: 2009	Environmental management systems. Requirements with guidance for use.
8	SR EN ISO 14004:2010	Environmental management systems. General guidelines on principles, systems and support techniques
9	SR EN ISO 14015:2010	Environmental management systems. Environmental assessment of sites and organizations
10	SR EN ISO 14050:2010	Environmental management systems. Vocabulary
11	SR EN ISO 14063:2010	Environmental management systems. Environmental performance evaluation. Guidelines and exemples
12	SR EN ISO 14013:2014	Environmental management systems. Environmental performance evaluation. Guidelines

Supporting innovation, measuring and improving the efficiency of national innovation systems are the most important issues and priorities in Europe, especially the mechanisms and measures to support innovation, turning research into new products and services.

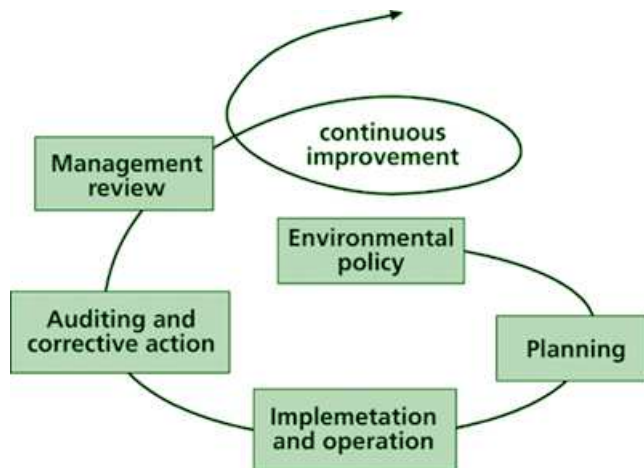
These environmental standards are an extension of the series of ISO 9000 quality standards by turning products and processes into greener versions. An environmental management system frames, implements and reviews environmental policies, all of which are intended to help

companies minimize their impact on the environment.

The ISO 14001 standard is applicable to all types of businesses, including industry and all trade and services sectors. It has similarities with the principles of the quality management system defined by ISO 9001, which facilitates the integration of management systems. The ISO 14001 standard describes the following key elements needed for certification, but does not include specific environmental performance criteria:

- environmental policy statement

- planning, including establishing procedures regarding the identification of environmental aspects and legal requirements
- environmental management system implementation, identifying responsibilities, training and emergency procedures
- checking and undertaking corrective action, including monitoring



**Figure 3.** The environmental management system according to ISO 14001 (the author's proposal).

The ISO 14001 model (Figure 3) follows the same PDCA improvement cycle used by the ISO 9001 quality management standard, to ensure that environmental issues are identified, controlled and monitored systematically. This approach actually seeks to improve the environmental management system over time.

The environmental management system will be different depending on the type, nature, size and complexity of the enterprise's activities, products and services. According to the ISO 14001 standard, the elements of the environmental management system are those shown in Table 3 [13].

Accordingly, the overall objective of the ISO 14001 standard is to achieve optimum environmental performance for the enterprise. On the other hand, the actual means for the implementation of the standard depends on a number of factors, including the environmental policy of the enterprise, the nature of its business, the specific conditions under which it operates. The successful implementation of an environmental management system is subject to the commitment of all levels of leadership, especially the top management that is responsible for implementing an environmental management system so as to meet the requirements of ISO 14001 [14].

**Table 3.** The elements of environmental management systems as defined by ISO 14001.

No.	EMS elements	ISO 14001 requirements
1	Environmental policy statement	<ul style="list-style-type: none"> <li>• in writing, expressing the commitment of top management to ensure compliance with environmental legislation and pursue the continuous improvement of environmental performance, thus ensuring not only the responsibility for the implementation of the environmental policy, but also its necessary support</li> </ul>
2	Environmental management system planning	<ul style="list-style-type: none"> <li>• the enterprise identifies the environmental aspects of its activities, which can be controlled and influenced, in order to determine those which have or can have a significant impact on the environment</li> <li>• in determining and analysing its objectives, the enterprise considers the legal prerequisites and other types of requirements, significant environmental issues and the views of the parties involved</li> <li>• to achieve the general and specific environmental objectives, the enterprise must establish and maintain one or more programs to achieve them</li> <li>• enterprise management must provide the necessary resources for environmental management system implementation and control</li> <li>• training needs should be identified and the entire staff whose work may have a significant impact on the environment must be adequately trained</li> <li>• the enterprise must consider the external communication process on significant environmental aspects and keep its decisions</li> </ul>
3	Environmental management system implementation and operation	<ul style="list-style-type: none"> <li>• to describe the essential elements of the environmental management system and their interaction, the enterprise must draw up documentation regarding the environment and also to establish and maintain procedures to control all documents</li> <li>• the enterprise must identify those operations and activities that are associated with significant environmental aspects, appropriate to its policy, general and specific objectives</li> <li>• the enterprise must establish and maintain procedures to identify potential accidents and emergency situations and respond to such situations and prevent and reduce the environmental impact that may be associated with them</li> </ul>
4	Checking and corrective and preventive action	<ul style="list-style-type: none"> <li>• periodically, the compliance with environmental regulations and laws in force must be assessed</li> <li>• any preventive or corrective action taken to eliminate the existing or potential causes of non-compliance must be adapted to the importance of problems and must be proportional to the impact on the environment</li> <li>• the enterprise must establish and maintain one or more programs and procedures to conduct periodic environmental management system audits</li> </ul>
5	Analysis of the environmental management system conducted by the management	<ul style="list-style-type: none"> <li>• the enterprise management must analyse the environmental management system at predetermined time intervals to ensure its continuing suitability, adequacy and effectiveness</li> </ul>

*The benefits of implementing the environmental management system.* The environmental management

system is a "part of the overall management system which includes organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining the environmental policy"[15]. Although at first glance the only thing that distinguishes an environmental management system from other management systems is that it focuses on the performance of environmental protection, small and medium enterprises that have adopted environmental management systems managed to achieve an important objective, namely to gain a higher market share.

The benefits of implementing the environmental management system can be experienced by significantly improving enterprise organization, reducing pollution and reducing costs. In the medium term, organizations will improve relations with the authorities by ensuring compliance with environmental legislation. An advantage resulting from the implementation of an environmental management system, which in the current context has a growing importance, is linked to the improvement in the enterprise's image, thus leading to market advantages, as the public wants a clean environment and products that have no negative impact on the environment.

Environmental management systems provide a tool to identify and solve specific environmental problems that can be implemented in an enterprise in different ways and according to specific conditions [14]. Cheremisinoff and Bendavid-Val support the idea according to which the implementation of an environmental management system reduces production costs, increases product quality and improves control over the production process. The ISO14001 standard was designed so that environmental protection improvements would be felt in every aspect of the enterprise's operations, with a complex and dynamic relationship between profitability and environmental concerns [16].

### 2.3. Occupational Safety and Health Management Systems

Occupational safety and health management has the same importance as the management of other functions of an enterprise, such as financial, commercial, human resources, production, quality, etc. As part of an integrated management system, in addition to social and legal obligations of enterprises, it involves major economic issues, raising profits by reducing downtime, absenteeism, lack of material losses due to accidents and damages, savings for medical leave, etc [17].

The occupational safety and health management system constitutes the tool for the design, organization and creation of procedures and mechanisms within the enterprise, to meet all health and safety requirements for the employees and to comply with relevant legislation. It includes self-monitoring and self-assessment components that allow detection of deficiencies in the organization and implementation of measures to improve the system [18].

Different studies have shown that accidents at work and

occupational diseases are very often associated with deficient management. Good management involves the best use of available resources and this requires a safe workplace that protects the health and safety of employees, which improves their motivation and mood, promotes quality production and therefore increases productivity [19].

There is no occupational safety and health management system that is universally applicable to all businesses regardless of size, sector and specific risks [20]. The basic conditions for an occupational safety and health management system to be effective are shown in Table 4.

**Table 4.** Conditions for the effectiveness of the occupational safety and health management system.

No.	Conditions for effectiveness
1	It must be applied voluntarily.
2	It must take into account the special characteristics of enterprises.
3	Evaluation procedures must be provided for the required mandatory external audits.
4	Its objectives must not be linked to certification.
5	It must be economically justified.
6	It must determine better enforcement of legal provisions on occupational safety and health.
7	It must encourage cooperation with the authorities that issue provisions in this domain.
8	It must maintain the role played in labour relationships by employee involvement mechanisms.

The BS OHSAS 18001 standard and the OHSAS 18002 implementation guidelines (including the OHSAS 18001 implementation guidelines) have been developed to meet the demand of those interested in the recognition of a standard occupational safety and health management system, which can help assess and certify an occupational safety and health management system [21].

The basic elements of an occupational safety and health management system are as follows:

a) Input data on occupational safety and health

Inputs include:

- management commitment and resources made available, including organizational structures, to support the development and implementation of a program on occupational safety and health;
- legal and regulatory compliance;
- responsibility, duties and authority;
- employee involvement, either direct, individually, or indirect, through representative entities, such as a committee on health and safety at work.

b) Documentation and implementation of the occupational safety and health management system

The main requirements for occupational safety and health management system documentation are:

- objectives related to occupational safety and health;
- performance measurement criteria;
- basic assessment and risk/hazard assessment;
- system planning and development;
- occupational safety and health management system manual and procedures.



System implementation requires the following elements:

- training, particularly in terms of technical skills and staff qualifications;
- a system for controlling risks, including contingency plans, to reduce or eliminate risks at work;
- preventive and corrective systems to protect personnel in the event of any problems that might occur;
- purchase goods and services that are compliant with enterprise security standards.

c) Output data on occupational safety and health

The measures that ensure the effectiveness of an occupational safety and health management system have to be quantifiable and must have a practical purpose. There are various options available:

- success in achieving the objectives relating to occupational safety and health;
- frequency of illnesses and injuries, possibly by comparison to other enterprises within the same sector;
- general health and wellbeing of the workforce;
- changes in the enterprise's efficiency, measured for example by improving productivity;
- overall performance of the enterprise.

d) Assessment

- a communication system for drafting, updating and dissemination of information related to occupational safety and health within the enterprise;
- an assessment system for auditing the occupational safety and health management system, investigating and analyzing the main causes that gave rise to accidents and ensuring medical surveillance of health.

e) Continuous improvement and integration

- processes to ensure continuous improvement, including regular assessments and procedures for evaluating incidents;
- periodic assessment of the leadership to assess the effectiveness of occupational safety and health management and to ensure compliance with legal and regulatory provisions;
- integration of the occupational safety and health management throughout the enterprise.

#### **2.4. The Benefits of Implementing the Occupational Safety and Health Management System**

An effective occupational safety and health management system ensures the optimum use of resources available; protects the health of the workforce and the local community, increases staff motivation to have a healthy and conscious behavior, increases staff and enterprise performance and creates safe jobs. Although the introduction of an occupational safety and health management system requires material investments, it leads to the direct and significant reduction of additional costs and to medium-term optimization of production processes.

In terms of occupational safety and health, the ability to determine the level of performance over time is essential in order to verify continuity regarding progress on eliminating occupational injuries and illnesses.

### **3. The Current State of Knowledge Regarding the Integration of Quality - Environment - Occupational Safety and Health Management Systems**

#### **3.1. Specific Requirements for the Integration of Management Systems in the Current Business Environment**

There have been growing numbers of new challenges for successful business management in the new millennium. Success can only be achieved if there is a systematic approach to processes. A successful integration of management systems essentially depends on good planning and effective implementation. An integrated management system is a logical and systematic management approach allowing optimal strategic and operational decisions that take into account all the key aspects that lead to the effective functioning of an organization, in terms of both quality and environment on the one hand, and safety or food hygiene on the other hand, etc [22].

The perspective of integrated management systems will require the orientation of managers of various organizations towards reformulating strategies and redefining the mission by changing vision. The relevance of integrated management systems is becoming much better defined by the increasing number of organizations that implement their "special" quality, environmental protection and health and safety management systems.

The academics interest in this topic, expert opinions and market development indicate that "integrated management systems" are seen as "management systems of the future", outlining the idea of transforming themselves into organizational concepts.

From an operational perspective, the integration of management systems lies in the combination and alignment of all internal management practices into a single system. Independent management systems may become part of the organization's integrated management system if strong connections develop between them beyond process borders [23].

The main objective of integrated quality - environmental - occupational safety and health management systems is to optimize an enterprise's efforts to meet customer needs and expectations of all stakeholders in terms of economic competitiveness.

According to the opinions expressed in the literature, the main condition for ensuring business success is the implementation of an integrated quality - environmental - occupational safety and health management system, which is a prerequisite for the development of enterprises in Romania [24].

Integration means assembling individual elements to form a whole (Figure 4). In practice, this means assembling and coordinating individual management systems and eliminating inconsistencies and duplication. Due to the overall vision, the

result is more than the pure sum of the management system components that are integrated. Essentially, all of these management systems consist of the same elements, although the structure of current reference documents regarding these management systems differs. The idea, and therefore the main advantage of an integrated management system, is to use existing elements, identify similarities between the elements and reference documents.



**Figure 4.** The integration of management systems.

An important similarity between the three reference documents is the consideration of customer needs and requirements and the needs and expectations of all stakeholders. Each organization has several stakeholders, which all have their own requirements, needs and expectations. Each stakeholder expects to derive some benefits from the enterprise. Top management must earn and maintain

stakeholder trust and must communicate the needs of these stakeholders within the enterprise.

There are many similarities between the three standards and for this reason, there are fewer and fewer enterprises that choose completely separate quality, environmental and occupational safety and health management systems. The most important commonalities in terms of the actual approach to the design, implementation and operation of quality, environmental and occupational safety and health management systems are presented below:

- all three reference documents take into account the concept of continuous improvement;
- all three reference documents take into account the concept of prevention;
- all three reference documents put the human factor at the centre of the processes linked to the design, implementation and operation of management systems.

In order to establish the correlation between the requirements of the three management systems, we must first define the product, stakeholders, requirements and non-compliance aspects for each of the three systems[15], [21], [25] (Table 5). The ISO 9001 standard aims at creating the product, while ISO 14001 and BS OHSAS 18001 standards specify the steps required in order not to unintentionally create the product.

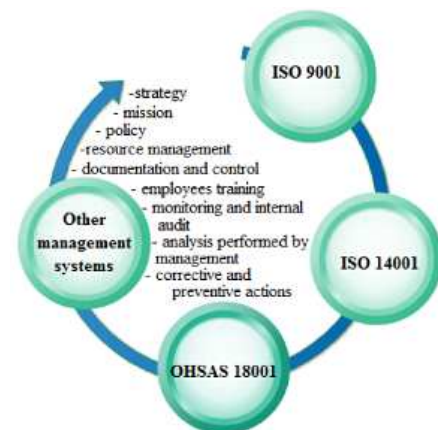
**Table 5.** Common elements of the three quality - environmental - occupational safety and health management systems.

Element	Reference document		
	ISO 9001	ISO 14001	OHSAS 18001
Product	Intentionally designed product, intended for a client	Unintentionally designed product, environmental performance (environmental impact)	Unintentionally designed product, accident, occupational disease (risks)
Product cause	Processes	Environmental issues	Risk factors
Stakeholder (direct)	Clients, owners, employees	Community, government, owners, neighbours, insurance companies, investors, suppliers, customers, etc.	Employees / unions, employers / owners, government
Requirements	Client, legal, regulatory, own, others	Legal, regulatory, own	Legal, regulatory, own
Non-compliance (deviation from requirements)	System / product	System / environmental performance	System / occupational safety and health performance

### 3.2. Models of Achieving Integrated Management Systems

Integration is the complete harmony and alignment of an organization's strategy and operations. This means that different departments and levels speak the same language and are tuned to the same wavelength. Most studies on the integration of management systems in the literature aimed at merging the quality management system, environmental management system, occupational safety and health management system and information security management system [26].

Indeed, to survive and thrive in a period of increasing global competition, organizations must consider every aspect of the processes, including cost reduction, employee welfare, work environment and the impact of the organization's operations on their neighbors and the local community [27], [28].



**Figure 5.** The integration of management systems. (author processing after [29]).

Moreover, companies need to address these issues while continuing to provide quality products and services, the concept of integrated management systems arising from this necessity.

Effective integration of various management systems can be achieved in three different ways, depending on the specific situation that exists in the organization at a certain point:

- by conversion: from a management system that is already implemented in the organization, adding further processes according to the requirements of the standards underlying the management systems desired to be introduced, thus developing specific practices and procedures; management systems based on internationally recognized referential have some common processes (Figure 5), which facilitates the application of this integration model.

The drawback of this model is the strong dependence of the successful implementation of an IMS on the existing management system that has been previously implemented in the organization – which represents the starting point [29].

- by merging: if there are more independent management systems that work in parallel within the organization, they can merge and even add other systems, formalizing practices; even if the documentation of different systems will be combined, we can only talk about an IMS when the practices that meet the purpose of each system will aim at achieving the IMS purpose.
- by technical design: even if the organization has implemented an operational management system, a completely new IMS will be developed through a unitary effort, which will aim at achieving a specific purpose; as part of this approach, the integrated management system shall be designed taking into account the recommendations of the standards, but it is strongly connected to business (restricted to the strategy, mission, distinctive competences).

## 4. Conclusions

In the literature, we can find several models for integrating different management systems, the most used are quality, environmental and health and safety management systems. The requirements of the organizations related to standards are to enable it to control those key management functions with maximum effectiveness and minimum bureaucracy.

In addition, the researches identify the advantages and the disadvantages of the integrated management system. We can consider as the main advantages the coordinated decisions, coherence in the organization's activity and in the end the efficiency with lower costs. If we focus on the disadvantages, the difficulty of implementation and the reduction of flexibility are the main ones. However, by analyzing all the advantages and disadvantages we can conclude that in order increase the performance in business a necessary step is implementation of integrated management systems.

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