
Integrated Management Systems and Sustainable Development

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Abstract

Management system standards, optional for organizations, have started to be considered as a strategic tool for organizations seeking institutional success and adopting innovative approaches. Establishing and managing these standards independently for the same organization yield some difficulties for organizations. It would rather be a more rational solution to provide a holistic view to all standards, which is to integrate them all. As integrated management systems can be shaped according to the needs of the organization, they involve different management system standards. Therefore, there is no common model defined for said integrated standards. These systems offer organizations a management philosophy for the processes to be successfully managed and to achieve desired results. When the emerging management philosophy is internalized by management and employees, a corporate culture is formed. The effects of integrated management systems on the sustainable development of the organization can be categorized as management, people, market, production, environmental and occupational health and safety totaling in six categories. Integrated management systems provide organizations with a management philosophy that enables processes to be successfully managed and to achieve desired results. Despite the advantages of integrated management systems for organizations, they may also have some drawbacks.

Keywords: integrated management systems, sustainable development, ISO 9001, ISO 14001, OHSAS 18001

1. Introduction

Organizations that have to sell more each day and aspire to maintain or increase their current market share need to adapt laws such as occupational health and safety and consumer protection. Changing expectations of consumers and other stakeholders should also be

considered. Moreover, they have to be flexible in their upcoming competition-based strategies so as to adapt to these changes. This adaptation plays a vital role for organizations. Within the scope of new competition-based strategy, organizations need to observe the developments taking place in their milieu, evaluate the current information, and by making best use of its resources so as to maintain sustainable development. In addition, the quality of products and services offered by businesses today is no longer adequate alone. Owing to the increased environmental awareness, current technological processes, procedures, and policies focus on improving and optimizing tools and techniques to minimize the effect on the environment. Indeed, management system standards (MSSs) are regarded as a strategic tool in order to effectively deal with processes such as governance, personnel, and occupational health and safety [1–3].

There are two major milestones in the emergence of MSSs. First, there is the industrial revolution that facilitated mass production and thereby reduced cost. The latter is the World War II that caused a change in the perspective of industrialization and qualified staff of the states involved. In the aftermath of the war, new balances emerged in the world affecting quality development and the necessity of establishing certain standards [4].

MSSs are published by the International Standards of Organization (ISO). ISO was founded in 1947 with its main headquarters in Geneva, Switzerland. It is an independent organization hosting members from 163 states. From 1947 up till now, ISO have published 21,623 international standards covering nearly all aspects of technology and trade [5].

There are a total of 57 MSSs currently in effect, developed by ISO for different coverage and areas of use [6]. Some of these standards (e.g., ISO 9001, ISO 14001, ISO 45001, ISO 27001) are applicable for all sectors. Apart from these, there are also sector-specific standards such as ISO 22000 for companies producing food, food equipment, and food packaging; ISO 13485 for companies producing medical devices; and ISO 16949 for automotive and subsidiary industry sectors.

The establishment of management system standards is optional for organizations. However, MSS has become a mandatory practice for organizations that want to keep-up with the developments in the world and gain prestige in trade [7, 8]. Various studies state that MSSs make positive contributions to the innovative performance of organizations when implemented constantly, systematically, and in the long run, it is also a vital tool for sustainable development. As a result, standards are becoming more and more important today [9–11].

Establishing and managing MSS in organizations independently of each other lead to some difficulties in organizations and do not yield the desired synergistic effect [12]. Instead, it would be a more rational solution to gather different MSS under a single roof and to provide a holistic view to all standards, which is to integrate them all. Today, integrated management systems are considered as a practical and a useful method for the future [13–15].

The purpose of this study is as such:

- to share the necessary knowledge to improve the effectiveness of the integrated management systems,

- to demonstrate its impact on sustainable development, and
- to lead the relevant stakeholders in choosing the best option

2. Literature review

2.1. Integrated management systems (IMS)

Before dwelling on the content of IMS, it is necessary to explain the concept of integration. Integration refers to “completion” and “aggregation” [16]. However, the term integration should not be confused with “combination” and “compliance” in terms of MSSs.

Compliance refers to parallel management system standards prepared for the same discipline despite showing great differences in terms of structure and content [17]. With regards to the term combination, it is the creation of a new system by adding different management systems to each other. According to the British Standards Institute (BSI), there is a four-step process in MSSs-integrated practice that goes from combination to integration [18].

1. Different management systems are implemented independently of each other in the same organization and in the same time frame (combination)
2. The organization prepares for integration by identifying common elements of different management systems after implementation
3. The organization eliminates the differences and removes the contradictions among different management systems. It adds new elements to the initial common elements. This step is about the combination of the systems
4. The organization creates a new meta-system that integrates all identified common elements

Integration, in terms of management systems, refers to owning each MSS content *per se*, which is prepared for certain disciplines. Being so, integrated management systems can be defined as a set of systems that are planned, applied and continuously revised, and improved in order to meet jointly multiple MSSs and other systems to which they have to comply [19–21]. In order for a company to conduct its operations systematically, it must comply with laws, MSSs, and customer conditions. It is therefore better to use the concept of integration of systems instead of integration of standards.

There are different views of integration in organizations [22–24].

- No integration: Each system exists with its own identity in the institution
- Partial integration: It refers to the harmonization of certain elements of each integrated system. It is projected at the middle management level that systems should be constructed according to business functions and be independent. It is assumed that systems should generally be compatible with each other, but this compatibility will not be 100%

- Full integration: Each integrated system loses its identity and a single multi-purpose meta-system emerges. It is assumed that systems will form a complete integration at executive and operational level

As IMSs can be shaped according to the needs of an organization, they are capable of including different management system standards. Therefore, there are still debates about IMS. However, literature review on IMSs show that ISO 9001 (QMS), ISO 14001(EMS), and OHSAS 18001(OHS) standards are the most researched standards [25–29]. It is possible to make different integrations by adding ISO 9001-ISO 14001, ISO 9001-OHSAS 18001, ISO 14001-OHSAS 18001, ISO 9001-ISO 14001-OHSAS 18001, or other standards that are specific to the sector. In other words, there is no limit to MSSs integration. An exemplary model of IMS is shown in **Figure 1**.

ISO 9001 quality management system: ISO 9001 defines the requirements for enhancing customer satisfaction by meeting the requirements of an organization’s customers and legal liabilities. The general provisions of the standard are organizational chart, duties, authority and liabilities, efficient use of resources, interrelationship of the processes, product or service design and development works, customer satisfaction, internal audit, continuous improvement, and documentation. The main purpose of the system is to prevent errors or defects that may occur either in the final product or service, or reduce them to the acceptable levels via interim controls. Its final revision was made in 2015 [31, 32].

There are many studies highlighting the benefits of ISO 9001 for organizations. From an overall perspective to these studies, the advantages can be divided into two categories. Internal benefits include cultural change in employees, organized action, management efficiency, better documentation, increase in production efficiency, and reduction of costs.

External benefits include customer satisfaction and loyalty, increase in market share of the business, readiness for official audits, strengthening the organizational image, and increase in competitive power [33–35].

ISO 14001 environmental management system: At present, with resources being gradually depleted in an irreversible process, it is the author’s view that all elements making-up the environment are under threat. It is now accepted by the whole world that the threat is not local or regional, but global. In both written and visual media, there are a lot of environment-oriented

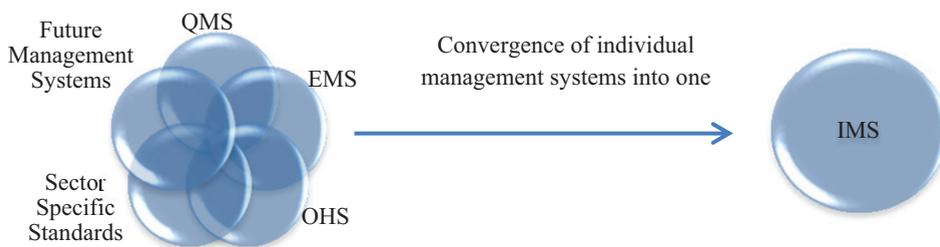


Figure 1. ISO 9001, ISO 14001, OHSAS 18001 IMS [30].

news and information. Today’s consumers not only demand maximum benefits from the product or service they purchase but also seek applications that do not harm the environment or at least cause damage at minimum level. Therefore, a number of states prepared various regulations to reduce the harm to the environment. Many organizations review their activities regarding the environment. In order for these revisions to yield success, they need to be handled systematically. ISO 14001 is an international standard that methodically exposes the conditions that must be fulfilled by performing risk analyses for every hazard at every stage from the design to the consumption processes of the products or services. Its final revision was made in 2015 [36–38].

OHSAS 18001 occupational health and safety management system: Each year nearly 2.3 million workers have occupational diseases and more than 6000 workers lose their lives [39]. Organizations are more and more interested in occupational health and safety practices due to legal regulations, economic policies, and most importantly the safety of the employees. ISO 18001 is an international standard that assesses potential hazards that may arise during the conduct of business for an employee via risk analyses; its main purpose is to create a better working environment and protect the health of employees. Based on OHSAS 18001, ISO published the ISO 45001 [40, 41].

The main reason for placing an emphasis on these three standards in studies conducted on IMSs is that human health, environmental dimension, and quality have become an integral part of today’s life. All three standards can be implemented in all the sectors regardless of activity type, size, and the number of employees of organizations. In addition, these standards cover different geographical, cultural, and social conditions [42].

ISO publishes the documentation statistics on ISO management systems on a regular basis (**Table 1**) [43].

The most common standards with the highest number of documentation globally are ISO 9001 and ISO 14001. They are followed by ISO 22000. The number of documentation increases in line with the increase in importance attached to management system standards. By observing **Table 1**, it can be stated that the reason why most studies are devoted to ISO 9001 and ISO 14001 among other integrated management systems is again evident in the number of certification.

Year	2010	2011	2012	2013	2014	2015	Total
ISO 9001	1,076,525	1,009,845	1,017,279	1,022,877	1,036,321	1,034,180	6,197,027
ISO 14001	239,880	243,393	260,852	273,861	296,736	319,496	1,634,218
ISO/IEC 27001	15,626	17,355	19,620	21,604	23,005	27,536	124,746
ISO 50001	—	459	2236	4826	6765	11,985	26,271
ISO 22000	18,580	19,351	23,278	24,215	27,690	32,061	145,175

Table 1. MSSs number of documentation by years.

2.2. IMS models

ISO did not publish an integrated management standard. However, based on performed research, 37 out of 57 that are currently in use can be applied in an integrated manner in terms of structure, content, terms, and definitions. There are common elements that facilitate MSS integration.

IMS can change according to the fields of activity, needs, mission, and visions of organizations. It is the author's view that this change is continuous in par with changing conditions. There are still various views regarding IMSs implementation. Hence, there is no common model defined. The most accepted models for IMSs in literature are listed below:

2.2.1. IMS model based on system approach

This model also has a system that uses all the resources in line with the same goals and objectives, so that the processes are compatible with each other. This system approaches each problem from a holistic point of view. This methodology helps to harmonize various functions of different MSSs. The integration in system approach can occur in different forms such as ISO 9001-based integration, ISO 14001-based integration, and ISO 9001-ISO 14001-based integration [44].

2.2.2. Management systems evolution model

This model makes an overall assessment of changes experienced by management systems in time, and creates a new model by assessing different integration models together. Management systems evolution model involves three phases namely standardization, rationalization, and integration. Renfrew and Muir [45] consider ISO 9001 as an initial point in terms of IMSs. Other sector-based cases were implemented later on. The next phase is the IMS matrix. The latter refers to the identification of similar elements among different MSSs. The fourth phase is the integration of procedures and processes. While it is possible to create integrated procedure for standards, it is rather difficult to attain this for processes. The next phase is QUENSH, which is the abbreviation of QU for quality, EN for environment, and SH for safety and health. Finally, a single management standard is formed (**Figure 2**).

2.2.3. IMS matrix

This model table shows the overlapping of elements. Its main purpose is to illustrate that different MSSs can be integrated [46]. **Table 2** shows an IMS matrix sample [47, 48].

There are different views in IMS matrix regarding the compatibility of elements between one another and their implementation by organizations. According to one point of view, there is a strong connection between ISO 9001 and ISO 14001, and it is possible to implement an IMS matrix in integration [49]. Another view suggests that standards have special functions pertaining to themselves, and problems are likely during an integration process based on IMS Matrix. [50].

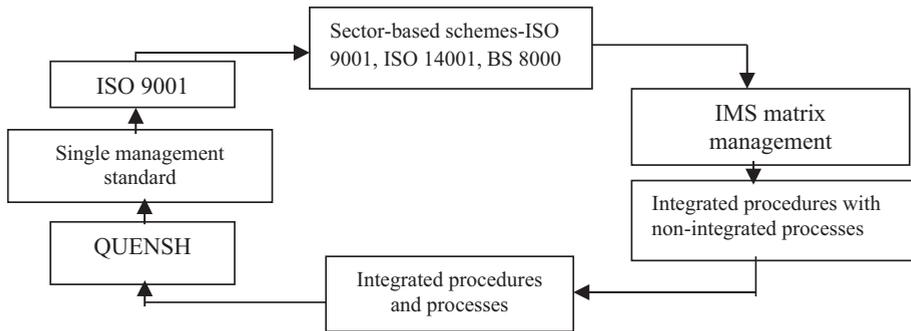


Figure 2. Management systems evolution model of Renfrew and Muir [45].

Based on the findings thus far, it may be stated that the similarities between MSSs, especially among the quality management standards, are considerably higher than the differences. It is the author's view that an IMS matrix is important as it shows how compatible or incompatible the different MSSs are in integration.

2.2.4. European Foundation for Quality Management (EFQM) excellence model

The EFQM excellence model was prepared by the European Foundation for Quality Management in 1988 to enhance competitive aspects of European organizations. EFQM excellence model was developed in such a way that it can be employed as a quality system by all kinds of organizations regardless of differences in sector and capacity. The philosophy of this model is based on self-assessment by organizations themselves. This method enables organizations to identify their current situation and to develop new strategies to enhance processes. EFQM includes nine criteria, five of which are enablers, and the remaining four are results. These criteria are leadership, strategy, people, partnerships and resources, processes, products and services, people results, customer results, society results, and key performance results. There are 32 sub-headings under these criteria [51, 52] (Figure 3).

It is worth mentioning at this point that the EFQM excellence model was not developed for management systems integration. However, the criteria suggested by EFQM overlap to a great extent with MSSs. Therefore, integration is possible with reference to EFQM criteria.

2.2.5. ISO Guide 72

ISO Guide 72 defines all MSSs common elements and proposes a certain rational order for IMSs. Thus, it is possible to develop, review, compare, and revise many standards, while increasing in-between standard compatibility. Table 3 shows common elements defined for MSSs in ISO Guide 72 standard [53].

Each of the MSSs is revised according to changing conjunctures and conditions. As the compatibility among standards is taken into account for the aforementioned revisions, one might expect an increasing number of similar standards in the future in terms of structure and

ISO 9001:2015	Standard number	ISO 14001:2015	Standard number
Scope	1	Scope	1
Normative references	2	Normative references	2
Terms and definitions	3	Terms and definitions	3
Context of the organization	4	Context of the organization	4
Understanding the organization and its context	4.1	Understanding the organization and its context	4.1
Understanding the needs and expectations of interested parties	4.2	Understanding the needs and expectations of interested parties	4.2
Determining the scope of the quality management system	4.3	Determining the scope of the quality management system	4.3
Quality management system and its processes	4.4	Environmental management systems	4.4
Leadership	5	Leadership	5
Planning	6	Planning	6
Actions to address risks and opportunities	6.1	Actions to address risks and opportunities	6.1
Quality objectives and planning to achieve them	6.2	Environmental objectives and planning to achieve them	6.2
Support	7	Support	7
Resources	7.1	Resources	7.1
Competence	7.2	Competence	7.2
Awareness	7.3	Awareness	7.3
Communication	7.4	Communication	7.4
Documented information	7.5	Documented information	7.5
Operation	8	Operation	8
Operational planning and control	8.1	Operational planning and control	8.1
Performance evaluation	9	Performance evaluation	9
Improvement	10	Improvement	10

Table 2. IMS matrix sample.

content. Hence, it is the author's view that implementation of different integration types will be even more easier in the future.

2.2.6. ISO 9001-based integration model

The history of ISO 9001 standard is older than the other standards. In addition, it is acknowledged that at present, companies initially establish this standard as it is applicable to all sectors. This is the most common model for IMSs establishment. System approach model, management

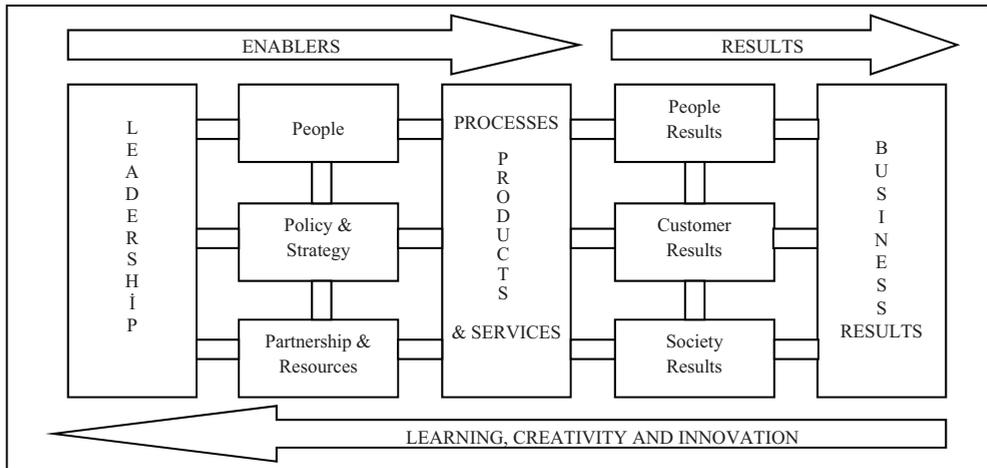


Figure 3. EFQM excellence model [52].

Main subjects that are common to all MSSs	Common elements
1. Policy	1.1. Policy and principles
2. Planning	2.1. Identification of needs, requirements and analysis of critical issues 2.2. Selection of significant issues to be addressed 2.3. Setting of objectives and targets 2.4. Identification of resources 2.5. Identification of organizational structure, roles, responsibilities and authorities 2.6. Planning of operational processes 2.7. Contingency preparedness for foreseeable events
3. Implementation and operation	3.1. Operational control 3.2. Management of human resources 3.3. Management of other resources 3.4. Documentation and its control 3.5. Communication 3.6. Relationship with suppliers and contractors
4. Performance assessment	4.1. Monitoring and measuring 4.2. Analyzing and handling nonconformities 4.3. System audits
5. Improvement	5.1. Corrective action 5.2. Preventive action 5.3. Continual improvement
6. Management review	6.1. Management review

Table 3. Common elements of ISO MSSs.

systems evolution model, IMS matrix model, and ISO Guide 72, all comply with ISO 9001-based integration. In this integration system, ISO 9001 is established initially, and other systems are integrated following its implementation. This model is based on process approach [54].

2.2.7. *ISO 14001-based integration model*

In this integration system, ISO 14001 is established initially, and other systems are integrated following its realization. It is the author's view that this is rarely implemented, as it is generally preferred by companies whose products or services are expected to yield severe harms to environmental conditions. It is possible to benefit from the IMS matrix in this model. The main objective of this model is continuous improvement as it is the case in the PDCA cycle [55].

2.2.8. *Co-establishment of ISO 9001 and ISO 14001 followed by the integration of others*

Initially, ISO 9001 and ISO 14001 standards are co-established as an integrated management system, and other systems are included in the integration later on [56].

2.2.9. *Integration based on integrated procedures or integrated processes*

The main purpose of this model is to prepare common documentation for each standard to be integrated. The main approach is continuous improvement. Firstly, common documents are determined for each standard. This mainly results in the full integration of procedures and the partial integration of processes. This is because each standard has its own processes. Then, the other documentation is integrated into the system. An IMS matrix can be utilized for this integration model. Moreover, this model is one of the phases of management systems evolution model [57].

2.2.10. *Single management standard*

IMs yield more benefits to the organization than it would benefit from the implementation of separate standards. Therefore, some countries have published a single management standard for integration. Single management standard was prepared with reference to organizations that are already implementing two or more standards.

Britain-PAS 99: This is the first integrated management standard in the world, being prepared with reference to six general conditions of ISO Guide 72. PAS 99 is designed to provide a general framework for organizations in the act of integrating their systems. Therefore, PAS 99 standard does not provide the benefit that a single organization requires from a management system [58, 59].

Denmark DS 8001: Within the scope of IMs development, the Danish motto is "Single business, single management". Danish Standards Foundation published DS 8001 to help organizations with two or more management systems transit to integrated management systems. DS 8001 involves ISO 9001, ISO 14001 standards and approaches specific to the EFQM model. The first section of the standard explains characteristics of a good management. The second section deals with common elements that should exist within a management system, while the third section includes terms that facilitate comprehension of the system [60].

Spain-AENOR: The Spanish Association for Standardization and Certification (AENOR) published an integrated management system standard based on the ISO 9001 and ISO 14001. This was the outcome of a number of studies that were initiated due to demands from companies. Two types of models, partial integration and full integration, are suggested in this standard [61].

Model	Scope	Model characteristics	Purpose	Limitations
The system approach	The requirements in the standards	An IMS based on both the PDCA circle and the process approach.	To avoid the problems regarding to different underlying models	Ignores culture
IMS Matriksi	The standards themselves	Harmonization of the elements in the standards	Show combinability	Aligned not integrated
ISO Guide 72	The common elements	The integration of common elements	Avoid duplication	Aligned not integrated
Integrated documentation	The documentation	One management handbook for all systems	Simplify and reduce documentation	Aligned not integrated
EFQM	Total quality management	Includes strategic and cultural management	Business excellence	Do not address the ISO certification requirements
ISO 9001-based IMS	The requirements in the standards	An IMS based on the process approach	An IMS based on the process approach	Ignores culture
ISO 14001-based IMS	The requirements in the standards	An IMS based on the PDCA circle	An IMS based on the PDCA circle	Ignores culture
The single management standard	The standards themselves	Based on only one common standard	One company, one system	ISO not exists, potentially inflexible, must be regularly updated

Table 4. Comparison of IMS models [57].

2.3. Comparison of IMS models

It is worth noting at this point that all standards are of equal importance. This is because each model has its own gains and drawbacks. The approaches of models toward the scope and integration are different from one another.

Moreover, some researchers [62] argue that the culture specific to any given society should be taken into account for integrated management systems or each system to be implemented. Hence, the need for developing new integration models still exists. **Table 4** shows comparison of IMS models.

3. Results and analysis

3.1. The advantages of integrated management systems and their contribution to sustainable development

The rapid increase in production, and consequently, consumption has made the concept of sustainability even more important today. Sustainability is a three-dimensional concept involving environmental, economic, and social issues.

Sustainable development for organizations can be defined as the ability to efficiently manage risks associated with economic, environmental, and social factors in order to create long-term value in organizations. By resolving the aforementioned risks from a holistic point of view, namely dealing with these risks via IMSs, it is possible to create positive contributions to performances and sustainable developments of organizations. In addition to benefits to organizations, it is revealed in many studies that IMSs have many gains that are closely relevant to sustainable development. Advantages influential on sustainable development can be summed up in six themes [63–72].

Management results:

- The image of the company was positively affected and it gained international prestige
- It improved management of relationships with suppliers and subcontractors
- A holistic perspective was offered to the events
- A transparent management approach emerged
- It saved time and costs by joint internal/external audits
- It facilitated the interrelationship of activities and co-ordination
- It attributed efficiency to internal and external communication
- It made risks easier to control
- It was beneficial for a clearer and explicit definition of liabilities and authorities
- It ensured efficient use of resources
- It facilitated strategic planning and decision making for executives
- Bureaucracy and procedures decreased while documentation got simplified
- The time and cost of implementing the systems decreased
- Incompatibility among ISO 9001, ISO 14001, and 18001 reduced
- Internal innovation increased
- An easier and more efficient management system was achieved
- Supplying capital became easier
- A continuous improvement process started
- The organization gains flexibility and speed for change

People results:

- Employee motivation and awareness increased
- Employees participated in system works at the highest level
- Employees adopted the system more

- Employees have more loyalty toward the organization
- Newly-employed staff adapted to the system more rapidly and easily

Production results:

- Productivity increased
- Scraps and wastes are reduced
- There is a considerable drop in error rate during process
- There is a cutback of production time
- Delivery process of productions is improved
- Costs decreased and profit increased
- Minimization in customer audits

Market results:

- There is an increase in customer demand
- There is a decrease in customer complaints
- There is an raise in customer satisfaction
- There is an amplification in quality perception of customers toward the organization
- Competitive power improved
- Market share and profitability grew

Environmental results:

- Complying with legal liabilities toward environment became easier
- The number of environmental damages decreased

Occupational health and safety results

- Adherence to legal requirements in terms of occupational health and safety became easier
- There is a decrease in the number of work-related accidents

3.2. IMSs drawbacks and difficulties of implementation

Though IMSs offer many advantages, it may also have disadvantages for organizations. These are as follows: [73–75].

- Focusing less on one or more than one of the standards constituting IMS
- Documentation and the management thereof become more complicated compared to previous actions

- Paper work and management associated costs increase
- Human resources were not used effectively

There are also certain difficulties in implementing IMS. These include, but are not limited to:

- Inadequacy of resources
- Lack of information
- Corporate culture
- Difficulties in focusing on different fields
- Constantly changing regulations and standards
- Lack of qualified staff
- Conflicts among employees and
- Difficulties in making changes.

In addition, some studies revealed that some administrators who work in organizations are opposed to IMS applications because they think that their expertise areas will lose their importance and that in integrated management systems, their positions will no longer be needed [76, 77].

4. Discussion and conclusion

From the agricultural age to the age of industry and finally to the age of information, all organizations operating in the public and private sector need new approaches to meet customer expectations, while differentiating from their competitors and succeeding in the market. Moreover, approaches that can meet the expectations of all stakeholders have gained importance. It is neither possible for an organization operating in a competitive market to ignore common values such as environment, social responsibility, and human resources, which should be protected as they may be regarded as a company's assets. Indeed, for a company to succeed in today's antagonistic marketplace, management systems standards and integrated management systems may be regarded as providing a holistic view of these standards. They are considered as an important tool for solving aforementioned problems and ambiguities.

Integrated management systems provide organizations with a management philosophy that enables processes to be successfully managed and achieve desired results. When the emerging management philosophy is internalized by executives and other employees, it has a positive impact on sustainable development as well as providing many benefits to the organization. Performed literature research indicates that integrated management systems have a constructive effect on management, employees, production, environment, market, occupational health and safety processes. However, these studies also highlight certain negative impacts that integrated management systems hold. Yet, if an assessment was made between the two, positive

effects of integrated management systems would outweigh the negative ones. Integrated management systems focus on medium- and long-term goals of companies rather than the improvement in short-term indicators and form a corporate culture to this end.

Different approaches to integrated management systems are still underway. However, studies focus on creating a common IMS model for all sectors in general. Instead, it is believed that creating a sector-specific IMS model will be more rational. Moreover, it is thought that this work may provide stakeholders with a building platform so as to broaden their interest in integrated management systems.

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